Executive Office of Environmental Affairs

CONNECTICUT RIVER

5-Year Watershed Action Plan

For the Massachusetts Section of the Watershed

2002-2007

EXECUTIVE OFFICE of ENVIRONMENTAL AFFAIRS

The Commonwealth of Massachusetts

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May 30, 2003

Dear Friends of the Connecticut River Watershed:

It is with great pleasure that I present you with the 5-Year Watershed Action Plan for the Connecticut River Watershed. The plan will be used to guide local and state environmental efforts within the Connecticut River Watershed over the next five years, as well as implement the goals of the Executive Office of Environmental Affairs. These goals include improving water quality; restoring natural flows to rivers; protecting and restoring biodiversity and habitats; improving public access and balanced resource use; improving local capacity; and promoting a shared responsibility for watershed protection and management.

The Connecticut River Watershed Action Plan was developed with input from state and federal agencies, Regional Planning Agencies, watershed groups, former watershed team members, and with extensive public involvement throughout the three reaches of the watershed. This unique approach helps us focus on the problems and challenges that are identified with stakeholders and community partners in each watershed, rather than being decided solely at the state level. The priority issues and action strategies identified in the plan include:

- Riparian Corridors
- Water Quality and Nonpoint Source Pollution
- Water Quantity
- Wildlife Habitat and Fish Passage
- Public Access and Recreation

I commend everyone that was involved in this endeavor. Thank you for your dedication, perseverance, and commitment. If you are not currently a participant, I strongly encourage you to become active in the Connecticut River Watershed restoration and protection efforts.

Regards,

Ellen Roy Herzfelder

Ellen Roy Herzfelder

Connecticut River Watershed Five-Year Action Plan

For the Massachusetts Section of the Watershed

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Massachusetts Executive Office of Environmental Affairs

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May 2003

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The following graduate students in Landscape Architecture and Regional Planning contributed to this report: Dan Bacon, Ann Chapman, Ruth Green (The Northern Reach Team); Brian Blanchard, Wendy Sweetser and Amanda Walker, (The Central Reach Team); Paul Bengtson, Marco Bertolotti, and Mary Scipioni, (The Southern Reach Team).

Special thanks to the members of the former Connecticut River Watershed Team for their help and assistance in the research for this report. The members of the team included John O'Leary, former Watershed Team Leader; Scott Jackson, Umass Extension; Christopher Curtis, Pioneer Valley Planning Commission; Russ Cohen, Riverways Program/Massachusetts Department of Fisheries, Wildlife and Environmental Law Enforcement; Whitty Sanford, Connecticut River Watershed Council; Joe Dunn, Franklin Regional Council of Governments; Tracey Miller, Massachusetts Department of Environmental Protection; Lawrence Golonka, Massachusetts Department of Environmental Protection; Paul Jahnige, Massachusetts Department of Environmental Management and Mike Downey, Springfield Water & Sewer Commission. Additional thanks to the following stakeholders for assisting in the research for this report: Terry Blunt, Connecticut River Greenway State Park/ Massachusetts Department of Environmental Management; Robyn Sherman, Montague Town Planner; Pete Westover, Amherst Conservation Commission Director; Catherine Skiba, Massachusetts Department of Environmental Protection, Source Water Assessment Program; Paul Davis, Hatfield Conservation Commission; Jack Hunter, Holyoke Town Planner; Mike Parker, former Westfield River Team Leader; Henry Kozloski, Agawam Conservation Commission; Rick Werbiskis, West Springfield Town Planner; Peter Pignelli, Owner, Peter Pan Bus Lines; George Drake, Morrill GIS lab manager.

We would like to express our appreciation to the EOEA's former Connecticut River Watershed Team for initiating this study and providing us with input during the development of this report.

Any reference to 'Massachusetts Watershed Initiative (MWI)' in this document pertains to a program that existed at the Executive Office of Environmental Affairs from 1993-2003. Any reference to a 'Watershed Team' refers to a multi-stakeholder team, facilitated by a 'Watershed Team Leader' that existed from 1998-2003 as part of the MWI.

EXECUTIVE SUMMARY

The Five-Year Watershed Action Plan is being developed for the Connecticut River Watershed in Massachusetts.

The Five-year Action Plan builds upon other planning efforts undertaken by the Watershed Team, as well as those conducted by other local, state, and federal agencies including The Connecticut River Strategic Plan, The Action Plan and Environmental Impact Statement for Silvio O. Conte National Fish and Wildlife Refuge and Connecticut River Greenway State Park Management Plan. The Connecticut River Strategic Plan was developed for the former Watershed Team by the Pioneer Valley Planning Commission with assistance from the Connecticut River Watershed Council, Franklin Regional Council of Governments, the Massachusetts Water Resources Research Center and the University of Massachusetts Extension Service. The Strategic Plan was developed through a public process during which input was obtained from stakeholders within the watershed and identifies long-term objectives and strategies that will guide watershed planning efforts.

The Connecticut River Watershed Action Plan is being developed to provide a framework for the implementation of short-term projects to help address the five priority issues of EOEA within the Connecticut River Watershed:

- **Riparian Corridors**
- **Water Quality and Nonpoint Source Pollution**
- **Water Quantity**
- **Wildlife Habitat and Fish Passage**
- **Public Access and Recreation**

This Action Plan identifies potential partner organizations and additional funding sources that could be utilized for implementing the proposed watershed projects.

SUMMARY OF OBJECTIVES AND PROPOSED ACTIONS FOR EACH REACH

Northern Reach: Vermont-Massachusetts State Line to Turners Falls Dam:

The Northern Reach is by far the most rural portion of the watershed. Significant characteristics of the Reach include the presence of agricultural areas, large tracts of forestland and the presence of two major hydroelectric generation facilities. Priorities for the Northern Reach focus on the protection of the existing natural resources and the mitigation of the effects of the hydroelectric power projects on the mainstem of the Connecticut River as well as the reduction of bacteria and nutrient levels in the river resulting from runoff generated by agricultural and other sources. The following priorities and actions are included in the plan.

Riparian Corridors:

Objectives:
- Increase awareness of the importance of riparian buffers along the Connecticut River and its tributaries.
- Reduce human-influenced erosion along the Mainstem of the Connecticut River and its tributaries
- Restore functional vegetative riparian buffers where appropriate.

Priority Actions:
- Develop and implement an educational outreach program to owners of land adjacent to the Connecticut River and its tributaries.
- Complete riparian corridor restoration demonstration projects.
- Continue to support the Connecticut River Watershed Councils "Sustainable Riverbanks" Project.
- Continue to assist with the control of invasive plant in riparian buffers.

Water Quality and Non-point Source Pollution:

Objectives:
- Protect water quality through the implementation of Growth Management strategies.
- Obtain additional water quality data about the Connecticut River and its tributaries.
- Reduce nonpoint source pollution throughout the Northern Reach with a particular focus on the mainstem of the Connecticut River and four priority tributaries (Fall River, Bennett Brook, Sawmill River and Fourmile Brook).

Priority Actions:
- Implement a Reach-wide water quality-monitoring program.
- Establish additional "Stream-Teams" for major tributaries throughout the Northern Reach.
- Assist willing communities with the implementation of growth management strategies.
- Promote the incorporation of improved stormwater management practices.
- Provide education and outreach to communities to reduce gravel road runoff.
- Support land protection efforts within the Northern Reach.

Water Quantity:

Objectives:
- Assist communities with the protection of drinking water resources.

Priority Actions:
- Assist with the implementation of recommendations for drinking water quality protection developed under the Source Water Assessment Program for the Northern Reach.
- Conduct assessments of high priority tributaries to identify areas of streamflow alteration.

Wildlife Habitat and Fish Passage:

Objectives:
- Improve fish passage within priority tributaries of the Connecticut River in the Northern Reach.
- Encourage the protection of important wildlife habitat within the Northern Reach.

Priority Actions:
- Continue to support the Stream Continuity Project.
- Use Stream Teams to identify other barriers to fish passage and wildlife movement within the Northern Reach.
- Incorporate protection of wildlife habitat into Growth Management Strategies.
- Continue to support and expand education on the importance of removing barriers to fish passage and wildlife movement in and along river and stream corridors.

Public Access and Recreation:

Objectives:
- Reduce impacts from recreational use on wildlife and sensitive habitat along the mainstem of the Connecticut River.
- Expand recreational access along the major tributaries of the Connecticut River where appropriate.

Priority Actions:
- Complete an updated inventory of existing boat access points in the Northern Reach.
- Implement an education program for boaters.
- Assist with the development of a public access point at the breached dam site on the Fall River in Bernardston Center.

Central Reach : Turners Falls Dam to the Holyoke Dam

The Central Reach contains a variety of land uses ranging from rural to urban. A mixture of urban, suburban, rural, and agricultural areas are present. This results in a wide range of issues involving nonpoint source pollution, effects of development encroaching upon wildlife habitat and intense recreational use of the Connecticut River. A unique feature of the Central Reach is the extensive development of surface drinking water supplies, which results in the modification of streamflows in several tributaries of the Connecticut River.

Riparian Corridors:

Objectives:
- Increase protection and restoration of riparian buffers in the Central Reach.
- Reduce human-influenced erosion along the Connecticut River and its major tributaries.
- Control invasive plant species within the riparian buffers of the Central Reach.
- Increase public awareness of the importance of riparian corridors as wildlife habitat and protection of water quality.

Priority Actions:
- Encourage enhancement of vegetated buffers on riverside properties undergoing redevelopment.
- Complete Riparian Corridor Restoration Projects.
- Implement a Riparian Corridor Educational Program for landowners, farmers, and local citizens.
- Complete Erosion Restoration/Mitigation Demonstration Projects.
- Identify erosion sites along the major tributaries of the Connecticut River in the Central Reach.
- Continue to support efforts to control invasive plant species within riparian buffers.

Water Quality and Nonpoint Source Pollution:

Objectives:
- Conduct additional water quality monitoring throughout the Connecticut River Mainstem and its tributaries.
- Reduce nonpoint source pollution along the Connecticut River and its tributaries.
- Increase level of protection for headwater streams throughout the Central Reach of the Watershed.
- Increase public involvement in watershed protection and improvement.

Priority Actions:
- Reclassify eligible headwater streams as "Outstanding Resource Waters" or "Cold Water Fisheries".
- Develop a Regional Open Space Protection Strategy focused on Water Quality Protection.
- Establish additional Stream Teams within the Central Reach.
- Develop a Reach-wide Water Quality Monitoring Program.
- Implement outreach and education to local communities on Stormwater Management Issues.
- Complete Nonpoint Source Pollution Reduction Demonstration Projects.

Water Quantity:

Objectives:
- Identify current and future impacts of drinking water supply development on the Connecticut River and its tributaries.
- Reduce impacts of hydroelectric generation projects on water level fluctuations on the mainstem of the Connecticut River.

Priority Actions:
- Assist with the implementation of recommendations for drinking water quality protection developed under the Source Water Assessment Program for the Central Reach.
- Conduct flow modification assessments on tributaries with surface drinking water reservoirs present.
- Determine impacts of future development on water supplies using EOEA build-out studies.

Wildlife Habitat and Fish Passage:

Objectives:
- Build support for the protection of wildlife habitat throughout the Central Reach of the Watershed.
- Support efforts to improve fish passage throughout the Central Reach of the Watershed.

Priority Actions:
- Initiate watershed-wide public awareness promotion on rare and endangered species.
- Support efforts to improve Fish Passage by acting as liaison between local interest groups and federal and state agencies.
- Implement the recommendations of the Stream Continuity Project.

Public Access and Recreation:

Objectives:
- Increase awareness of the impacts that recreational use can have on the environmental quality of the watershed.
- Work towards the realization of a multi-state Water Trail along the Connecticut River.

Priority Actions:
- Create designated primitive campsites along the Connecticut River Water Trail in the northern section of the Reach.
- Develop an additional car-top boat access along the Connecticut River Water Trail.
- Implement a recreational user education program.

Southern Reach: Holyoke Dam to the Connecticut-Massachusetts State line

The Southern Reach is the most urbanized area of the entire watershed. Urbanization of the Reach has resulted in alteration of the natural features of the area. The urbanization has also resulted in the separation of communities from the rivers. The highest priority in the Southern Reach is to bring more people to the river, thereby increasing public awareness of the need for environmental restoration projects. Increasing public access to the river and streams in the Southern Reach will play an important role in building support for environmental restoration. Efforts should focus on increasing secondary contact recreation activities such as boating and fishing. The action plan proposes focusing watershed improvements at the confluence points. The confluence points of the Connecticut River and its tributaries are strategic areas for both providing access to the river and restoring riparian buffers.

Riparian Corridors:

Objectives:
- Protect remaining riparian corridors at the confluence points of the Connecticut River and its tributaries.
- Encourage restoration of riparian corridors throughout the Southern Reach especially during the redevelopment of sites along rivers and streams.
- Minimize impacts on riparian vegetation from urban and suburban development throughout the Southern Reach.

Priority Actions:
- Control invasive plant species throughout the Southern Reach.
- Support the protection of existing riparian corridors and the confluence points of the Connecticut River and its tributaries.
- Complete a demonstration project for the reduction of impervious surfaces within a riparian buffer.
- Conduct Outreach and Education for Riparian Buffer Property Owners.

Water Quality and Nonpoint Source Pollution:

Objectives:
- Increase awareness of water quality issues within the Southern Reach of the Watershed.
- Assist Southern Reach communities in building their capacity to improve and protect water quality and reduce nonpoint source pollution.

Priority Actions:
- Conduct Outreach to communities to help them implement Stormwater Management Regulations.
- Assist with the establishment of Stormwater Utilities in willing communities.
- Complete a demonstration project for the reduction of nonpoint source pollution.
- Take steps to encourage the implementation of the CSO Abatement Plan throughout the Reach.
- Conduct Education and Outreach to citizens about the quality of fish in the Connecticut River and its tributaries.

Water Quantity:

Objective:
- Assist local communities with the protection of their drinking water supplies.

Priority Actions:
- Assist with the implementation of recommendations for drinking water quality protection developed under the Source Water Assessment Program for the Southern Reach.
- Provide model Aquifer Protection Regulations to communities that need them.
- Assist communities with the implementation of water conservation programs.

Wildlife Habitat and Fish Passage:

Objectives:
- Promote the protection of remaining wildlife habitat throughout the Southern Reach of the Watershed.
- Improve fish passage and river connectivity along the tributaries to the Connecticut River in the Southern Reach.

Priority Actions:
- Encourage protection of certified endangered species habitat along the Connecticut River.
- Work with the Massachusetts Highway Department to develop a protocol to improve fish passage at road crossings at the time of reconstruction.
- Identify appropriate locations for fish passage improvements on the smaller tributaries within the Southern Reach.

Public Access and Recreation:

Objectives:

- Improving the quality of the existing access points to the river through improvements in existing facilities and in the maintenance of those facilities, and by encouraging private enterprise that promotes use of the river.
- Improving opportunities for cyclists and walkers from populated areas to access the mainstem of the Connecticut River.
- Promoting the existence of the river access points and feeder trails by marking them with a variety of methods and by opening up the areas visually to the more traveled areas.
- Increase the number of access points along the Connecticut River and its tributary in a manner that balances recreation and resource protection.

Priority Actions:

- Work with communities in the Southern Reach to improve existing public access areas.
- Create a system of lateral greenways along the major tributaries of the Connecticut River.
- Assist with the development of a public access area at the confluence of the Connecticut River and Bagg Brook.
- Provide education to recreational users about minimizing impacts on natural resources.
- Develop formal picnicking areas along the river for use by the boating public.
- Develop a Recreational Management Plan for the stretch of the Connecticut River below the Holyoke Dam.
- Provide additional access for fishermen.
- Develop a Public Relations Campaign to increase knowledge and use of public access sites.

WATERSHED-WIDE OBJECTIVES AND PRIORITY ACTIONS

Although the Action Plan identifies specific priorities and actions for each individual Reach of the Watershed, several actions should be implemented watershed-wide. The lack of water quality information on the Connecticut River and its tributaries is an issue that must be addressed on a watershed basis. Any monitoring program that is developed must be formulated to be easily adapted to the specific needs of each Reach. Assistance with the implementation of drinking water protection plans developed from the findings of the Source Water Assessment Program (SWAP) should be completed watershed-wide. Watershed-wide efforts to control the spread of species should continue. Education and outreach programs should be established watershed-wide as well. This includes outreach to landowners about riparian corridor issues, recreational users about potential impacts on wildlife and watershed communities about stormwater management and the protection of drinking water supplies. An advantage to this watershed-wide focus will be an increase in the number of potential partners available to help develop and implement these educational programs.

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INTRODUCTION

Project Overview:

The following Five-Year Watershed Action Plan was developed for the Connecticut River Watershed in Massachusetts.

The Connecticut River Watershed Action Plan was developed as a landscape-planning studio in the Department of Landscape Architecture and Regional Planning at the University of Massachusetts-Amherst under the direction of Assistant Professor Robert L. Ryan. Funds from a settlement agreement in the Connecticut River Watershed administered by EOEA were used to fund this project. The major focus of this plan is to provide a framework for the development of specific projects that can be implemented within the watershed during the next five years to achieve the following watershed goals:

- **Riparian Corridors**: Improve the ecological health of riparian corridors throughout the watershed with a specific focus on protecting and/or restoring vegetated riparian buffers along the Connecticut River Mainstem and its major tributaries.

- **Water Quality and Nonpoint Source Pollution**: Implement best management practices (BMP's) for improving water quality and reducing nonpoint source pollution at strategic areas throughout the watershed. Protect drinking water supplies through public policy assistance and encouraging coordinated land protection efforts. Obtain additional information about water quality throughout the watershed. Reduce non-point source pollution from agricultural, rural, suburban and urban sources.

- **Water Quantity**: Improve instream flows where needed. Balance use of water for drinking, hydroelectric generation and agricultural activities with ecological concerns.

- **Wildlife Habitat and Fish Passage**: Restore the connectivity of wildlife habitats with a particular focus on improving aquatic habitat and fish migration, protecting important wildlife habitat areas and the removal of barriers to fish passage along the Connecticut River Mainstem and its tributaries.

- **Public Access and Recreation**: Re-connect communities to the River by improving public access and recreational opportunities where appropriate considering environmental concerns.

The Five-year Action Plan builds upon other planning efforts undertaken by the EOEA, as well as those conducted by other local, state, and federal agencies including The Connecticut River Strategic Plan, The Action Plan and Environmental Impact Statement for Silvio O. Conte National Fish and Wildlife Refuge and Connecticut River Greenway State Park Management Plan. The Connecticut River Strategic Plan was developed for EOEA by the Pioneer Valley Planning Commission with assistance from the Connecticut River Watershed Council, Franklin Regional Council of Governments, the Massachusetts Water Resources Research Center and the University of Massachusetts Extension Service. The Strategic Plan was developed through a public process during which input was obtained from stakeholders within the watershed and identifies long-term objectives and strategies that will guide watershed planning efforts.

The Connecticut River Watershed Five-year Action Plan was developed to provide a framework for the development of short-term projects to help achieve the goals of EOEA. The Action Plan identifies geographic locations of watershed issues and proposes actions to address those issues. This Action Plan identifies potential organizations and funding sources that could collaborate with EOEA in implementing the proposed watershed projects.

Priority actions listed in this plan need not be limited to projects best suited for government action, but can identify potential actions, which could be undertaken by other stakeholders in the watershed. Priority actions should be selected on the basis of public environmental benefit, potential advocates for the project, estimated cost, and potential funding sources.

Overview of the Study Area:

The focus area of this project is the Connecticut River Watershed in Massachusetts as defined by EOEA. The watershed boundaries include only the area that drains directly into the mainstem of the Connecticut River. The project focus area does not encompass major tributaries including the Millers, Deerfield, Chicopee, and Westfield Rivers. Map A provides an identification of the specific watershed boundaries for this project.

The watershed of the mainstem of the Connecticut River within Massachusetts encompasses 660 square miles and includes all or part of 44 communities (Pioneer Valley Planning Commission, 2001). The watershed is divided into three geographic reaches as shown on Map A. The Northern Reach from the Vermont State Line to the Turners Falls Dam is characterized by a rural landscape with some agricultural and rural-residential development. Major influences in the Northern Reach include the development of hydroelectric facilities along the mainstem of the Connecticut River. Although the southern boundary of the reach is the Turner's Falls Dam, the entire Town of Montague has been included in the reach for simplification. A mixture of land uses including agricultural, forested, and urbanized areas characterizes the Central Reach, from the Turners Falls Dam to the Holyoke Dam. Issues in the Central Reach include the effects on rivers and streams from agricultural and urban runoff, the development of public drinking water supplies and the encroachment of suburban development. The Southern Reach, stretching from the Holyoke Dam to the Connecticut State Line, is the most heavily urbanized section of the watershed and includes the cities of Springfield, Holyoke, and West Springfield. Major issues in the Southern Reach include combined sewer overflows, urban runoff, and the lack of adequate vegetated riparian buffers. Map A also illustrates the land use patterns within the watershed.

Structure of the Report:

The report is organized geographically by Reach. A description of the assessment findings and identification of the priorities for each Reach is presented. These findings and priorities are organized into the five watershed issues described above. To perform the assessment of watershed issues within each Reach, existing planning studies as well as geographic information system datalayers obtained from MassGIS were examined.

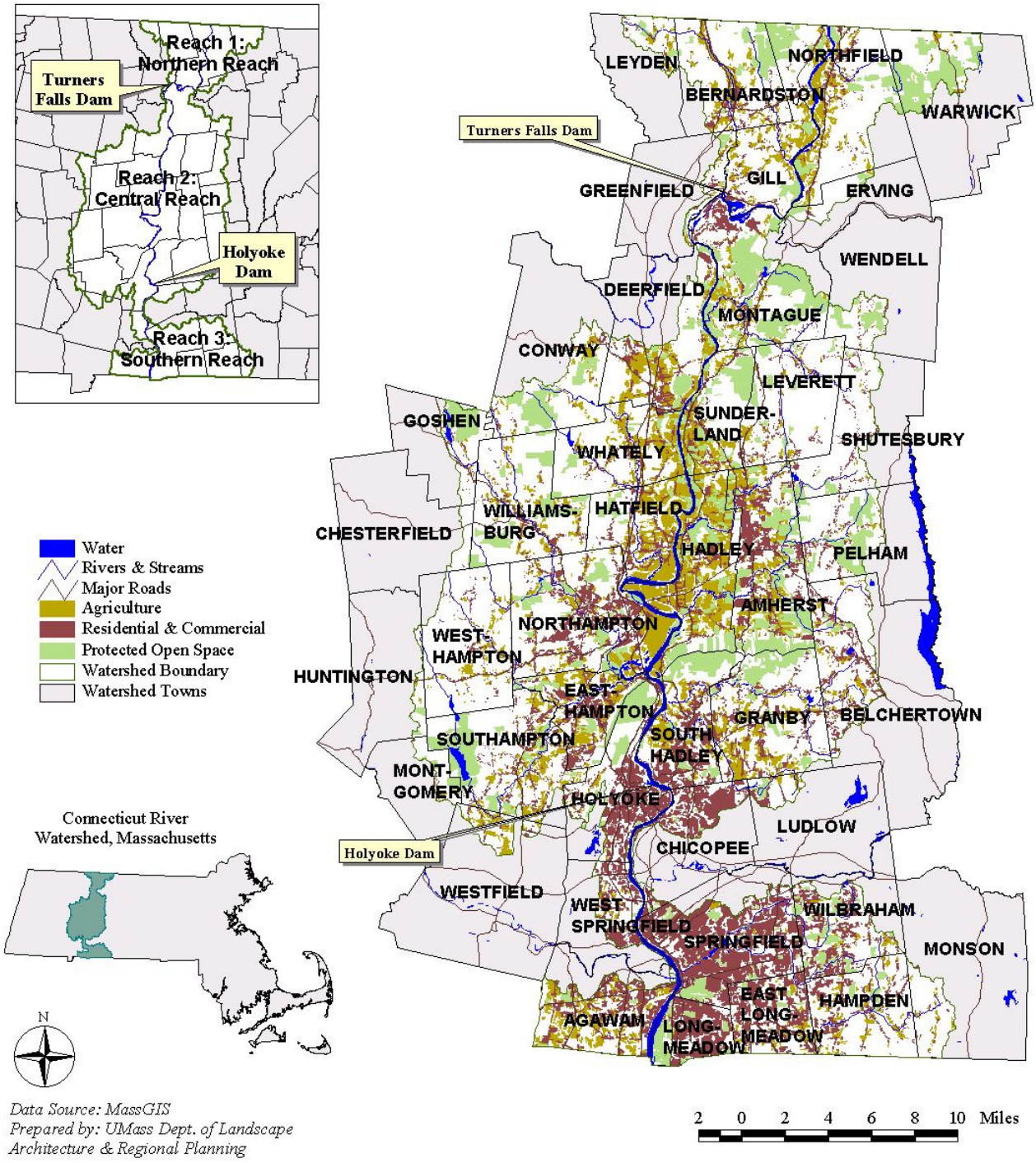
Following the identification of priorities for each Reach, recommended actions are presented along with a proposed five-year action plan to implement the actions. The action plans for each Reach include an identification of the specific objectives and strategies that are proposed, an identification of potential partners and funding sources that could be utilized to implement the plan, and a matrix that details action items to be completed in each of the five years covered under the plan.

Public Outreach:

Efforts were made during the development of this Action Plan to include as much public involvement as possible. Three public involvement strategies were utilized. First, during the initial development of the Action Plan, numerous stakeholders were contacted and interviewed. These stakeholders included former watershed team members, representatives of non-profit organizations, and local officials. Second, a draft of the Action Plan was sent to each of the communities within the Connecticut River Watershed in the Spring of 2002. Letters soliciting comments along with a summary of the plan were sent to the planning departments, planning boards and conservation commissions of each of the communities within the watershed. Third, a series of three public meetings was held during the Spring of 2002 to solicit input from local officials and citizens. One meeting was held in each of the three Reaches of the watershed. Appendix B includes a list of officials and stakeholders that were contacted as well as summaries of the proceedings of each of the three public meetings. Input obtained from these outreach efforts was used in developing priorities and actions for the watershed.

Map A

Connecticut River Watershed in Massachusetts



Data Source: MassGIS
Prepared by: UMass Dept. of Landscape Architecture & Regional Planning

CHAPTER 1: THE NORTHERN REACH

The Northern Reach is the most rural section of the Connecticut River Watershed in Massachusetts. The Reach extends from the Vermont-Massachusetts State Line to the Turners Falls Dam in Montague. To fully represent adjacent issues, the entire town of Montague has been included in this section. The Reach contains a significant amount of agricultural lands along the Connecticut River and its tributaries. Major tributaries include Bennett Brook, Four-Mile Brook, Fall River, and the Sawmill River. This chapter details the results of the assessment, determination of priorities and the formulation of a five-year watershed action plan for the Northern Reach of the Connecticut River Watershed (Map 1.1). The assessment portion of the project consisted of a review of relevant planning documents, GIS datalayers, interviews with local officials and stakeholders as well as a limited amount of field investigations.

RIPARIAN CORRIDORS

Assessment Findings:

Threats to Riparian Corridors

The assessment conducted for the Northern Reach identified several threats to the riparian corridors in the reach. These threats are described below.

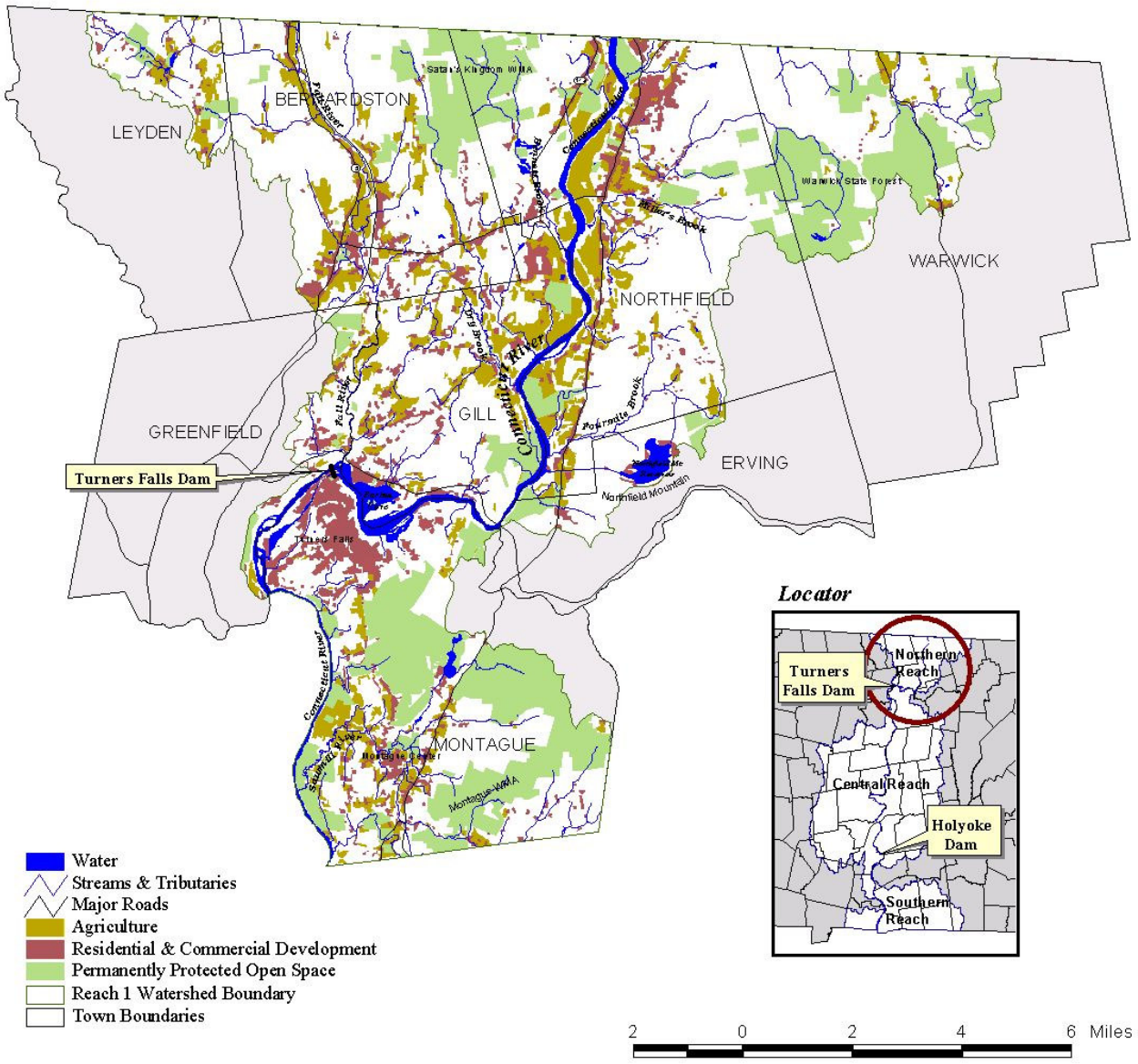
- **Hydroelectric Impacts:** The Northfield Mountain Project diverts water from the Connecticut River and releases it back to the river to generate electricity. According to Simons & Associates (1999) this creates fluctuations in the water level in the Turners Falls Pool and can contribute to bank erosion. These practices are allowed under the facility's current permit. In the future, permit reviewers should consider modification of these practices in subsequent relicensing of the facility.

- **Recreational Use:** Boat wakes from recreational powerboats operating in the Turners Falls Pool are a contributing factor to streambank erosion (Cohen, 2001).

- **Agriculture:** Runoff containing sediments and nutrients can occur from agricultural fields adjacent to rivers and streams. In the Northern Reach, the greatest concentration of agriculture is in the towns of Northfield and Gill. In some instances agriculture goes clear up to the banks; in others there is a thin buffer of vegetation. Map 1.2 identifies the location of intensive agricultural use that is mostly likely to contain reduced riparian buffers.

Map 1.1

Northern Reach, Connecticut River Watershed (MA)

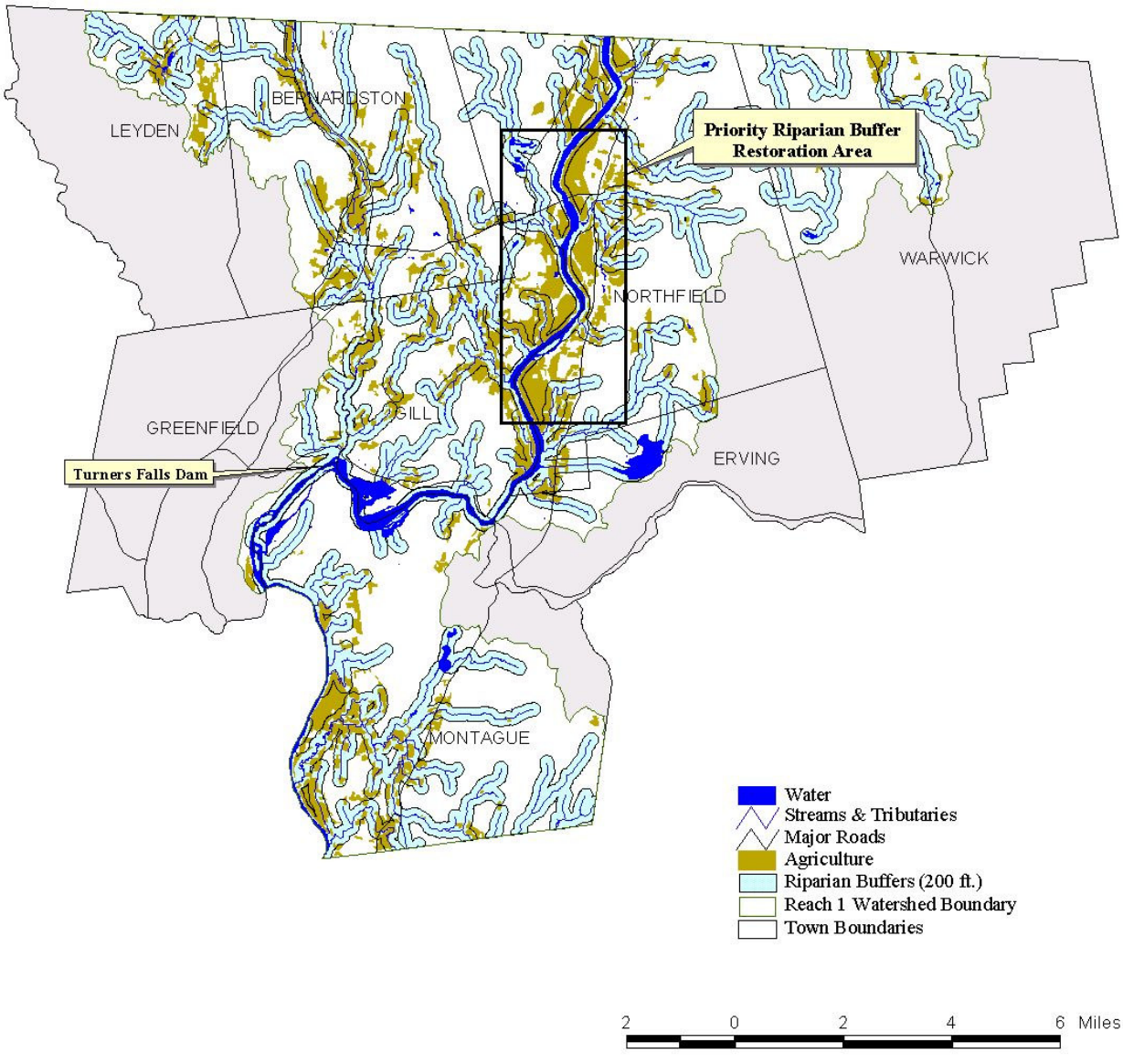


Northern Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

Map 1.2

Riparian Corridors



Northern Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

- **Impervious surfaces:** such as roads, parking lots, and commercial facilities in close proximity to the river can limit riparian buffers and their effectiveness in controlling and preventing runoff. While this is less of a problem in the Northern Reach than further downstream, there are a few sites along the mainstem, such as in Turners Falls/Barton Cove area where roads and/or parking lots are within 50 feet of the river's edge.

- **Invasive plant species** such as water chestnut, Japanese knotweed, phragmites, fanwort, and purple loosestrife are a problem throughout the watershed.

Tributary Erosion Issues:

Several erosion issues were identified along tributaries to the Connecticut River and its tributaries in the Northern Reach.

- **Fourmile Brook (Northfield):** Erosion from roadways in this tributary's watershed may be contributing to sedimentation into fish spawning areas located in the stream. Past attempts have been made to obtain funding to complete assessment work under Section 604b of the Clean Water Act for stream bank restoration (Dunn, 2001).

- **Bennett Brook (Northfield):** Currently there are suspected pollutants and sediment erosion issues in this waterway possibly from adjacent developed areas (Dunn, 2001).

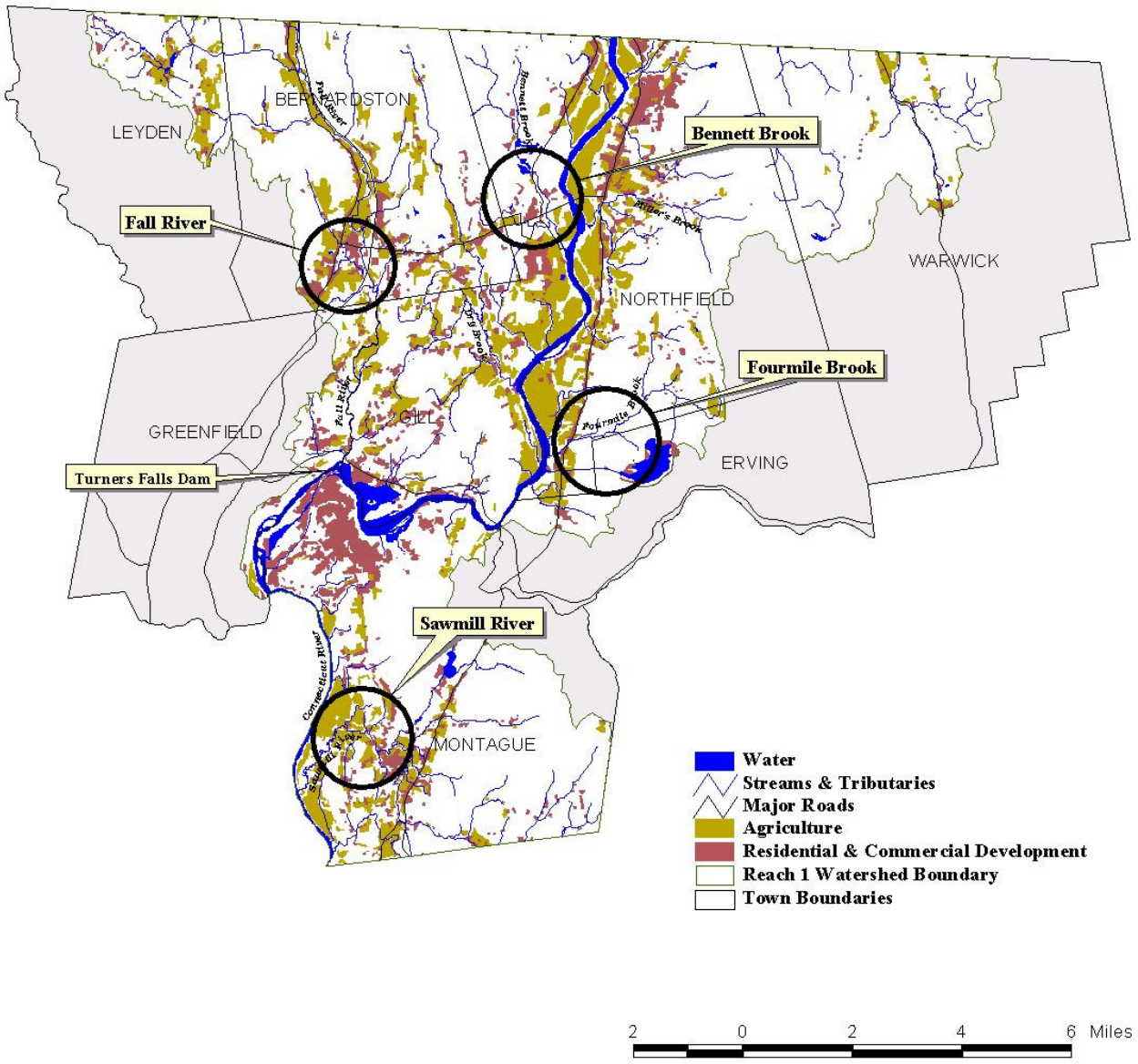
- **Fall River (Bernardston):** One-third of the Bernardston dam was washed out in a recent hurricane resulting in the erosion of the opposite shoreline. This event has unnaturally altered the riverbank, tearing out soil, rock and trees and depositing them downstream. The breached dam has since been completely removed (O'Leary, 2002).

- **Sawmill River (Montague):** This River also has erosion issues, primarily due to stormwater runoff, neighboring development, and a breached dam (Sherman, 2001). The river also exhibits a natural erosion process as its channel meanders through soft soil and clay deposits.

Map 1.3 provides a graphic representation of the location of these tributary erosion sites.

Map 1.3

Priority Tributaries



Northern Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

Riparian Corridor Objectives and Priority Actions:

To help protect and improve riparian corridors within the Northern Reach, EOEA should focus its efforts on improving the public's understanding of the importance of vegetated riparian buffers and how they can be improved. While the former Watershed Initiative was not directly involved in the protection of land, it is important to coordinate land protection efforts between agencies such as the Massachusetts Department of Environmental Management, Department of Food and Agriculture, the Massachusetts Division of Fisheries and Wildlife, and the United States Fish and Wildlife Service and local communities and land trusts.

Objectives:

The following is a list of objectives for the improvement of riparian corridors within the Northern Reach of the Watershed.

- Increase awareness of the importance of vegetated riparian buffers along the Connecticut River and its tributaries.

- Reduce human-influenced erosion along the mainstem of the Connecticut River and its tributaries

- Restore functional vegetative riparian buffers where appropriate.

Priority Actions:

The following are specific actions that should be completed during the next five years to improve riparian corridors within the Northern Reach

- **Develop and implement an educational outreach program to owners of land adjacent to the Connecticut River and its tributaries.** The program should focus on teaching the importance of vegetated riparian buffers and how private landowners can manage their land to prevent the loss of riparian vegetation as well as restore buffers. Efforts should focus on educating landowners about the myriad functions of vegetated riparian buffers including erosion control, water quality protection and wildlife habitat functions. This effort should be coordinated with the local office of the USDA Natural Resource Conservation Service to educate farmers about existing Farm Bill Programs that can be used to restore and/or protect vegetated riparian buffers.

- **Complete riparian corridor restoration demonstration projects**. This will consist of identifying willing landowners, completing site assessments and implementation of restoration actions such as removing erosion sources and replanting vegetation.

- **Continue to support the Connecticut River Watershed Councils "Sustainable Riverbanks" Project**. The objective of the project is to identify and prioritize the restoration of erosion sites along the Connecticut River Mainstem (Sanford, 2001). Efforts are being made to identify sites that are naturally eroding as opposed to sites that are eroding due to human influence. Following completion of the assessment of the mainstem, efforts will be made to expand the identification and restoration of appropriate erosion sites to the mainstem's tributaries (Sanford, 2001).

- **Continue to assist with the control of invasive plants in riparian buffers**. This will include working with the Silvio O. Conte National Fish and Wildlife Refuge as well as interested volunteer groups within the Northern Reach to eradicate any existing populations of invasive plants as well as prevent further infestations through monitoring and educational efforts.

Riparian Corridor Educational Outreach:

A range of educational materials and programs should be established in the Northern Reach to help encourage protection of riparian buffers. Outreach should focus on private landowners adjacent to the Connecticut River and its tributaries. The Great Falls Discovery Center, a joint venture of the Silvio O. Conte Federal Fish and Wildlife Refuge and the Massachusetts Department of Environmental Management, could provide assistance with the development of an educational program. The existing efforts of other groups including the Connecticut River Watershed Council should continue to be supported and could be used as models to expand educational efforts.

Riparian Buffer Restoration and Enhancement:

Agricultural runoff can be a source of nonpoint source pollution. While farmers are often resistant to taking farmland out of production, it may be possible to identify alternative crops that provide both habitat and income for farmers, while reducing the bank erosion and non-point source pollution occurring throughout the Reach. The Connecticut River Joint Commission (CRJC) website has an excellent series of brochures on establishing riparian buffers on farmland. This material suggests several types of plantings (trees such as willow, various shrubs and other plantings). Alternatively, experimental crops such as blueberries or Christmas trees may also be an option. One example of a potential demonstration site for restoration has been identified. The site is the Bennett Meadows Wildlife Management Area owned by the Massachusetts Department of Fisheries, Wildlife and Environmental Law Enforcement. The site has extensive agricultural fields located very close to the river and, consequently, a minimal vegetated riparian buffer.

Efforts should be made to encourage the use of existing incentive programs as well as develop additional programs for the preservation and/or restoration of vegetated riparian buffers. Existing programs that could be promoted include the Wildlife Habitat Improvement Program (WHIP) and the Environmental Quality Incentive Program (EQIP) administered by the USDA Natural Resource Conservation Service. These programs provide funding which can be used to restore and/or protect vegetated riparian buffers within agricultural lands. Potential additional incentives include the development of state or local tax incentives to encourage farmers to remove riparian lands from agricultural production and the encouragement of cultivating appropriate nursery plants within riparian areas through state contracted demonstration programs.

WATER QUALITY AND NONPOINT SOURCE POLLUTION

Assessment Findings:

The rural character of the Northern Reach has largely prevented significant industrial pollutants, combined-sewer-overflows, and urban run-off issues as compared to the Central and Southern Reaches. Despite this, water quality is a concern in both the Connecticut main stem and its tributaries within the Northern Reach. The 1998 Connecticut River Water Quality Assessment identified the following water quality issues (Massachusetts Department of Environmental Protection, 2000).

- **Bacteria Levels:** Elevated fecal bacteria levels have historically been documented in this segment. The "Swimming Hole Project" periodically monitored sites in The Northern Reach for bacteria. The sites monitored included the Northfield Boat Ramp, Route 10 Bridge, Munn's Ferry, Kidd's Island, Barton Cove, Great Falls, and the Rock Dam (Pioneer Valley Planning Commission, 2001). A likely source of high bacteria is nonpoint source pollution from within the watershed.

- **Sedimentation, Turbidity, and Flow Alteration:** Sedimentation and turbidity levels are impacted by hydrodynamics created by the Turners Falls Project and the Northfield Mountain Pumped Storage Project. This has contributed to accelerated and/or excessive bank erosion in this area, resulting in sedimentation and turbidity (Massachusetts Department of Environmental Protection, 2000). Sedimentation and turbidity cloud the water and have a negative affect on the aquatic life present (particularly inhibiting the feeding and spawning habits of fish). Identification of erosion sites has been completed and bio-engineered bank stabilization projects have been underway since 1996.

- **PCBs:** The presence of PCBs in fish has been identified in the Connecticut River mainstem (Kennedy & Weinstein, 2000). As a result, the Department of Environmental Protection has issued a fish consumption advisory. This advisory is based on ten-year-old data and the 1998 Water Quality Assessment encourages further testing to identify current contamination levels.

Nonpoint Source Pollution:

The primary source for information about nonpoint source pollution in the Northern Reach was the Connecticut River Basin 1998 Water Quality Assessment that was also used to research the water quality of the area. The water quality assessment indicated high bacteria levels, sedimentation, turbidity, and erosion as the major issues contributing to the inability for the Connecticut River Mainstem to meet water quality standards. The report identifies nonpoint source pollution as a problem throughout the Northern Reach. The identification and quantification of nonpoint source pollution typically involves extensive assessment. A cursory review of land use data is a good method to identify potential locations where nonpoint source pollution exists.

Protection and Restoration of Tributaries

The completion of the Northern Reach assessment identified Bennett Brook, Fourmile Brook, Fall River, and the Sawmill River as the priority tributaries in the Northern Reach. Each of these tributaries are experiencing erosion or nonpoint source pollution issues. EOEA should assess these tributaries to identify possible restoration actions.

The following additional concerns about nonpoint source pollution were identified during the assessment of the Northern Reach.

- **Threats from Future Development:** The Connecticut River Basin 1998 Water Quality Assessment Report identified that approximately 75% of the Northern Reach is forested land. Future development within the Northern Reach could negatively impact water quality through an increase in impervious surfaces and runoff. (See Map 1.4). The communities in the Northern Reach are rural in character with small municipal budgets and limited or non-existent planning staffs. When development occurs, the communities may be ill equipped to channel growth in a way that protects the landscape, farmland, and water resources. It is essential to implement growth management plans prior to an influx of development.

- **Gravel Road Runoff:** The Northern Reach contains numerous gravel roads that are in close proximity to rivers and streams. Proper maintenance of these roads can prevent runoff that causes siltation in waterbodies.

Water Quality and Non-point Source Pollution Objectives and Priority Actions:

The following is a list of objective and priority actions identified for the Northern Reach of the Watershed based on the assessment findings. The priorities focus on two areas. The first is addressing the existing nonpoint source pollution problems associated with agricultural and urban runoff as well as forestry practices within the Reach. The second area is the implementation of growth management strategies as means of preventing future water quality degradation.

Objectives:

- Protect water quality through the implementation of Growth Management strategies

- Conduct additional water quality monitoring of the Connecticut River and its tributaries. Relatively little information exists about the state of water quality within the Northern Reach. The Connecticut River Basin 1998 Water Quality Assessment Report provides a compilation of known information for the entire mainstem watershed. Only 14% of the named rivers and 44% of the total river miles within the watershed were assessed (Kennedy & Weinstein, 2000).

- Reduce nonpoint source pollution throughout the Northern Reach with a particular focus on the mainstem of the Connecticut River and the four priority tributaries (Fall River, Bennett Brook, Sawmill River and Fourmile Brook).

Priority Actions:

- **Implement a Reach-wide water quality-monitoring program.** This should be coordinated with the Watershed's five-year monitoring and assessment schedule. Volunteer organizations should be used to increase EOEA's capacity for conducting monitoring. Monitoring should be focused on the Mainstem of the Connecticut River and the four priority tributaries (Fall River, Bennett Brook, Sawmill River and Fourmile Brook).

- **Establish additional "Stream-Teams" for major tributaries throughout the Northern Reach.** Watershed organizations currently exist for Bennett Brook and the Sawmill River. Stream teams should be established for the Fall River and Fourmile Brook to increase public awareness and support for environmental issues and projects.

- **Assist willing communities with the implementation of growth management strategies.** Many communities in the Northern Reach could benefit from planning assistance to help prepare for future growth pressures. Possibilities for assisting towns with implementing growth management strategies include funding a "circuit rider" planner who would be available to the towns for consultation as well as providing assistance with the use of build-out data and the newly released build-out tools.

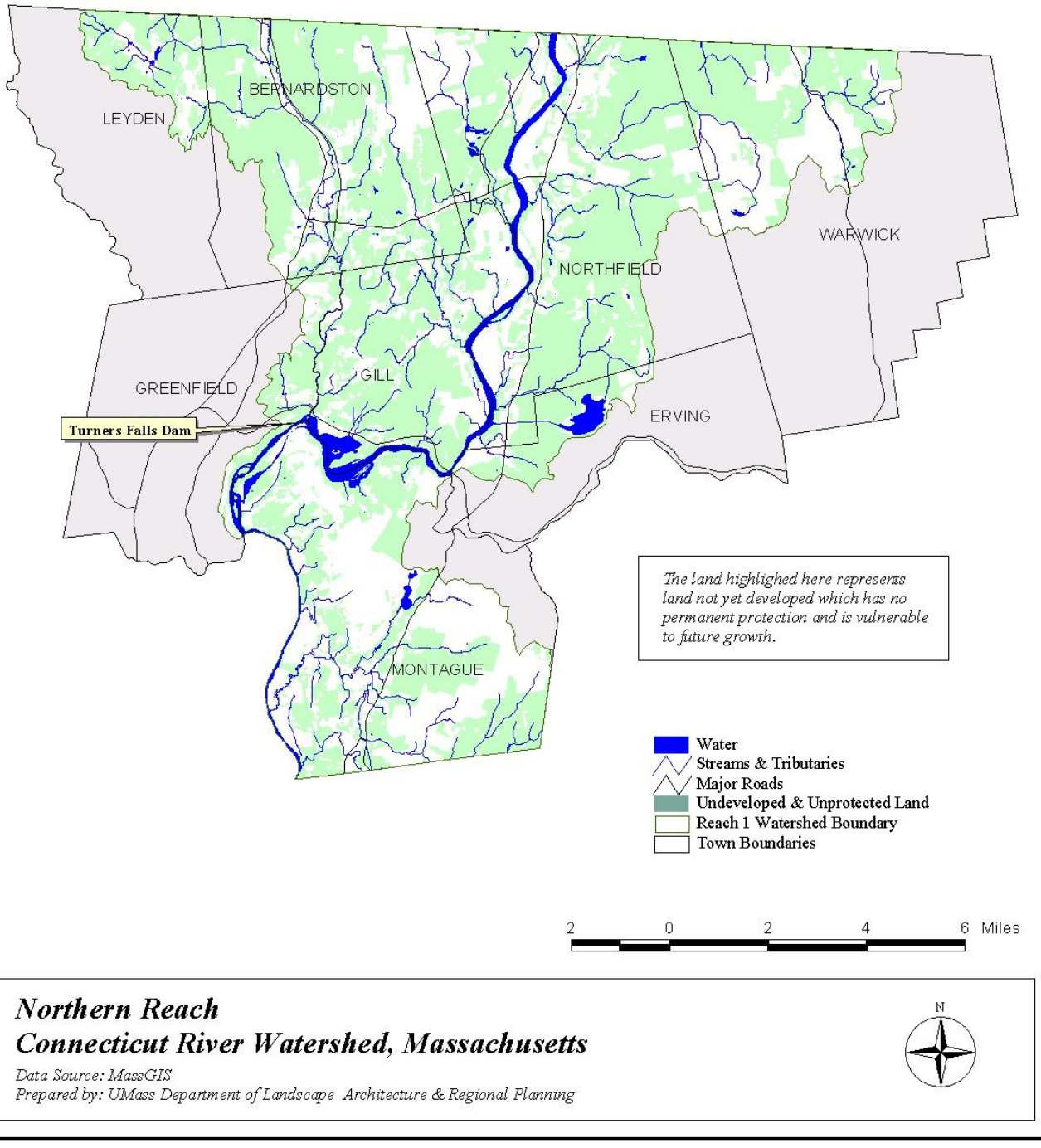
- **Promote the incorporation of improved stormwater management practices.** This should be accomplished by assisting the Northern Reach communities with the implementation of the Stormwater Management Policy adopted under the State's Wetlands Protection Act and EPA's NPDES Permit Program.

- **Provide Education and Outreach to communities to reduce gravel road runoff.** The focus of this action is to make communities aware of the Dirt Road Management BMP Manual developed by the Department of Environmental Protection and to assist communities with the implementation of the appropriate best management practices.

- **Support land protection efforts within the Northern Reach.** Although EOEA has not had an active role in land protection within the Connecticut River Watershed, it should continue to support the efforts of others such as the Department of Environmental Management, the Department of Fisheries and Wildlife, the Franklin Regional Council of Governments and local lands trusts.

Map 1.4

Undeveloped & Unprotected Land



Northern Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

WATER QUANTITY:

Assessment Findings:

Residents of the Northern Reach of the watershed rely mainly on groundwater supplies for their drinking water. The attached water resource map (Map 1.5) identifies the current well sites, wellhead protection areas, aquifers, and resource water supply areas within The Northern Reach. The rural landscape of the area does not necessarily ensure the quality of drinking water. The proximity of underground storage tanks and current and future development could easily degrade the quality of these water supplies if they are not adequately controlled.

The Massachusetts Department of Environmental Protection is in the process of implementing the Source Water Assessment Program (SWAP) mandated by the federal government. The purpose of the program is to identify potential pollutant sources within drinking water protection areas (Skiba, 2001). Information will be provided to the public water supply system managers to assist them in protecting the quality of the drinking water. There may be a role for EOEA to play in the dissemination of this information to local communities and, more importantly, in implementing the various recommendations of the SWAP assessments to protect public water supplies from contamination.

The development of hydroelectric generation projects along the Connecticut River has resulted in the alteration of streamflow within the river. This is especially evident below the Turners Falls Dam where the river is diverted through canals that feed the electric generating turbines. During the summer, the river channel below the dam may be deprived of the vast majority of its natural streamflow. Upstream from the dam, the Turners Falls Pool experiences water level fluctuations resulting from the operation of the dam. It has been suggested in the past that an assessment of the dam operation's impact on the water quality and quantity within the River is needed (Department of Environmental Protection, 2000). The appropriate time to address this issue may be during the periodic relicensing of the hydroelectric projects. This will not occur in the timeframe of this action plan, however.

Water Quantity Objectives and Priority Actions:

For the Northern Reach of the Watershed, water quantity objectives include the protection of drinking water aquifers and the identification of streams and rivers that experience alterations in streamflow due to dams and water withdrawals.

Objectives:

- Assist communities with the protection of drinking water resources while also identifying and seizing opportunities to protect and enhance natural flow regimes.

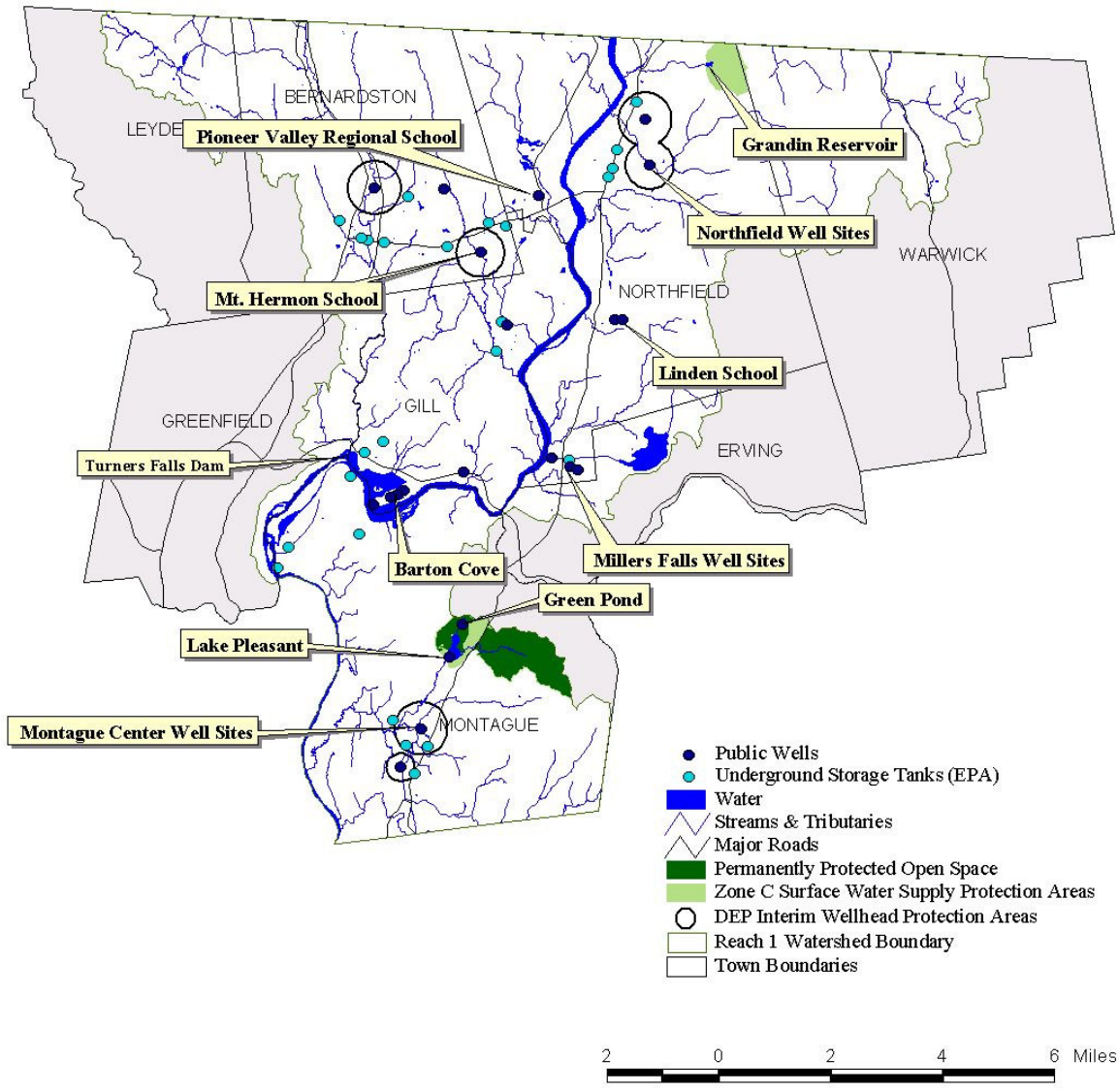
Priority Actions:

- **Assist with the implementation of drinking water source protection recommendations developed under the Source Water Assessment Program for the Northern Reach.** This may include assisting with outreach to communities about the program and the implementations of recommendations to protect drinking water quality in the reports generated by the Department of Environmental Protection.

- **Conduct assessments of tributaries to identify areas of streamflow alteration.** Conduct assessments to identify streamflow alteration in the tributaries within the Reach and begin formulation of plans to address streamflow alterations.

Map 1.5

Water Resources



Northern Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

WILDLIFE HABITAT AND FISH PASSAGE

Assessment Findings:

The Northern Reach of the Watershed contains an abundance of important wildlife habitat. The BioMap for the Connecticut River Valley (developed as part of the Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program, 2001) indicates large areas of Core Habitat along the Connecticut River in the towns of Northfield and Gill, in the Barton Cove area, and in Montague (especially south of Barton Cove, contiguous with the Montague Sand Plains) This habitat includes both riverine and upland habitats. In addition, high priority aquatic habitat has been identified for the Northern Reach in the Silvio O. Conte National Fish and Wildlife Refuge Action Plan (U.S. Fish & Wildlife Service, 1995). "Special Focus Areas" in the Connecticut River Watershed provide habitat for rare, endangered, or noteworthy species. In the Northern Reach, three Special Focus Areas have been identified including the Turners Falls Airport, the Montague Sand Plains and the Sawmill River from its confluence with the Connecticut River to the Route 63 Bridge. The Connecticut River Mainstem (particularly the segment from the Turners Falls Dam to Rt. 116 Bridge) contains both important riverine and riparian habitats. Several species of fish, including American shad, blueback herring, and shortnose sturgeon spawn within this stretch of the mainstem. In addition, over 30 other rare plants and animals are also found within this stretch of river. These areas are illustrated on Map 1.6.

Barriers to Fish Passage

Several major dams exist in the Northern Reach of the watershed. The principal dam on the main stem in the Northern Reach is the Turners Falls Dam, used to generate hydroelectric power. The major environmental impacts of the dam include riverbank erosion, water withdrawals and their effect on river wildlife habitat, and fish passage. Upstream fish passage facilities do exist at Turners Falls Dam. Downstream fish passage facilities were scheduled for construction in 1994, but currently remain pending (Connecticut River Atlantic Salmon Restoration Commission, 1998). Other dams that have been identified as possibilities for fish passage improvements include the following.

- **Fall River (Bernardston):** The dam in Bernardston Center was breached during a major storm in 1999 (Cohen, 2001). There is some local interest in developing a public access area at the site. Although the dam has already been removed, there may be an opportunity to complete a fish habitat improvement project as part of the development of a public access area.

- **Sawmill River (Montague):** Plans are underway to install a fish passage at the Spaulding Brook Dam in Montague.

In addition to dams, other barriers to fish passage occur within the Northern Reach of the Watershed. These barriers can include railroad crossings, culverts, livestock fences and road crossings. A comprehensive inventory of obstructions to fish passage does not currently exist.

Several state and federal agencies are currently involved in the restoration of Atlantic Salmon to the Connecticut River Watershed. The Connecticut River Atlantic Salmon Commission has identified sections of the Fall River, Sawmill River, Fourmile Brook and Mill Brook as important potential spawning areas for Atlantic Salmon. The Commission currently has no plans to increase fish passage for Atlantic Salmon within these rivers. Fish passage improvements will be deferred until a significant number of salmon are present in the mouth of the river seeking upstream passage (Connecticut River Atlantic Salmon Restoration Commission, 1998). The Conte National Fish and Wildlife Refuge has also

identified important blueback herring spawning habitat within the Sawmill and Fall Rivers (U.S. Fish & Wildlife Service, 1995).

Wildlife Habitat and Fish Passage Objectives and Priority Actions:

As previously stated, a number of state and federal agencies are involved in the improvement of fish passage and the removal or repair of dams within the watershed. Historically, EOEA has played a limited role in improving fish passage within the watershed. The former Watershed Initiative provided support for planned projects in the past. Other state agencies such as the Department of Fisheries and Wildlife and local land trusts are active in protecting wildlife habitat.

Objectives:

- Improve fish passage within priority tributaries of the Connecticut River in the Northern Reach.
- Encourage the protection of important wildlife habitat within the Northern Reach.

Priority Actions:

- **Continue to support the Stream Continuity Project.** This project will be valuable in developing a watershed-wide strategy for the removal of barriers to fish and wildlife movement in and along river and stream corridors.
- **Use Stream Teams to identify other barriers to fish passage and wildlife movement within the Northern Reach.** Focus on completing basic assessments of the Connecticut River's tributaries in an effort to identify additional barriers to fish passage and wildlife movement and identify opportunities for their removal or other mitigation.
- **Incorporate protection of wildlife habitat into Growth Management Strategies.** Promote the protection of important wildlife habitats during the development of growth management strategies in the Northern Reach communities.
- **Continue to support and expand education on the importance of removing barriers to fish passage and wildlife movement in and along river and stream corridors.** This will include supporting the continuing efforts of groups such as the Connecticut River Watershed Council as well as developing additional outreach to local citizens.

Educational Initiatives

EOEA should continue to support the educational efforts of organizations such as the Connecticut River Watershed Council and agencies such as the Conte National Fish and Wildlife Refuge. Possible funding sources for additional educational programs include.

- Northeast Utilities System: Environmental Community Grant Program, aimed at school education projects. www.nu.com/environmental/grant.asp.
- Atlantic Salmon Federation: internships, fellowships and grants available for further study. www.asf.ca/Awards/Awards.html.
- Connecticut River Salmon Association: CRSA Schools Program and CRSA Grants Program. www.ctriversalmon.org.html.

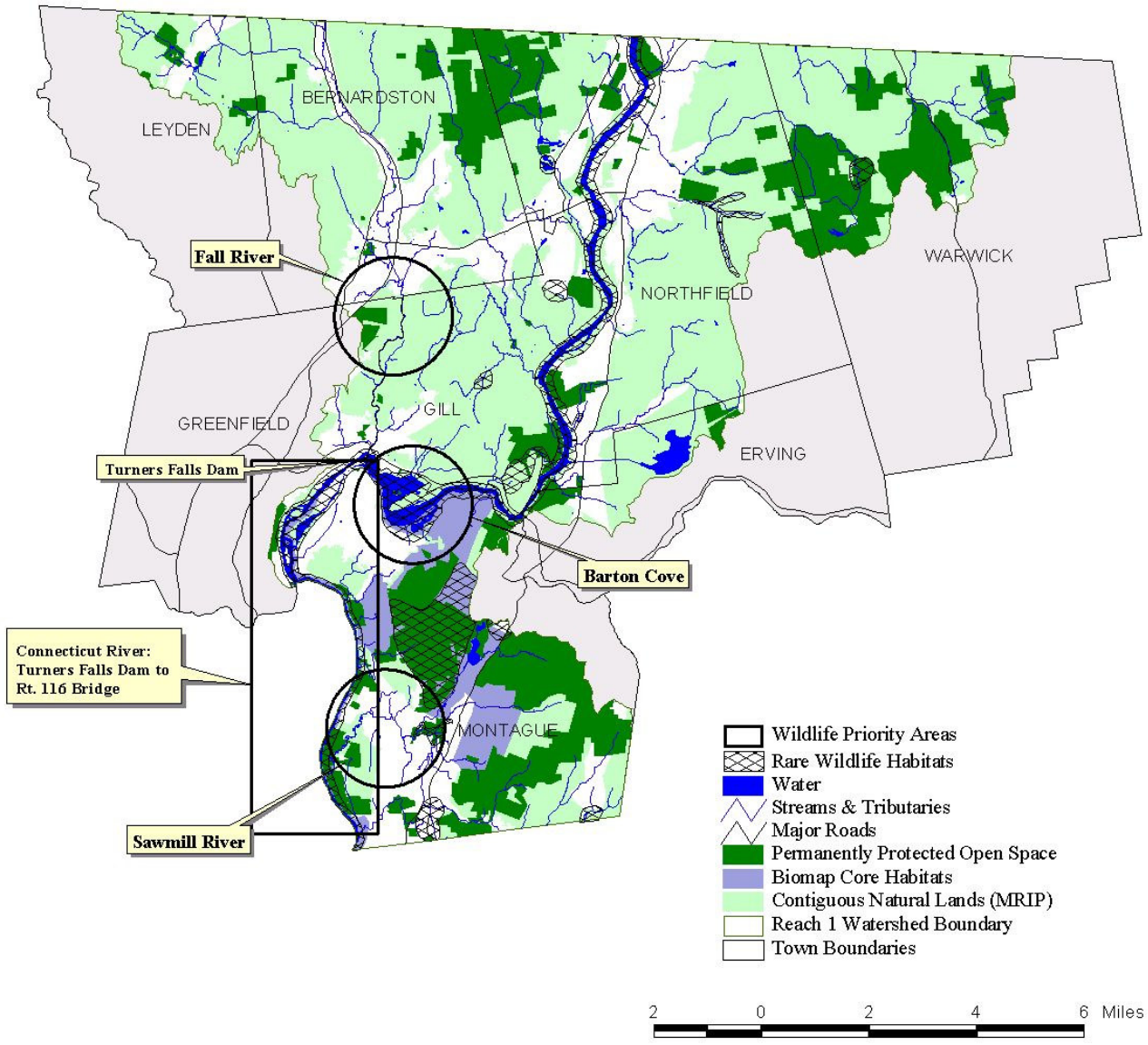
- Connecticut River Education Initiative: Earth and Us Grants for school projects. www.wgby.org/edu/crei/pages/projects.html.

- Conte National Fish and Wildlife Refuge Challenge Cost Share Grants.

- National Fish & Wildlife Foundation. www.nfnf.org.

Map 1.6

Wildlife Habitat Priority Areas



Northern Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

PUBLIC ACCESS AND RECREATION

Assessment Findings:

The Connecticut River in the Northern Reach is heavily used for recreational activities. Several public access points including either canoe or boat launches currently exist as well as two camping areas along the river. These access points are primarily located in the Barton Cove Area immediately upstream from the Turners Falls Dam. The high use of this area can result in impacts on wildlife habitat along the river. Threats from recreational use include the possible introduction of invasive species from improperly cleaned boats. Boat wakes can contribute to streambank erosion as well as have impacts on wildlife, such as rare dragonflies and other insects that emerge from the riverbank, during certain times of the year.

Existing planning studies have not identified a need for additional public boat access locations along the mainstem of the Connecticut River within the Northern Reach (Pioneer Valley Planning Commission, 2001). Therefore, public access to the river is probably adequate for the near future, and access issues pertain more to problems of overuse at existing sites. There is currently a need for additional education and outreach for recreational users to help prevent adverse impacts on the wildlife and habitat along the river and to prevent recreational user conflicts between paddlers and power craft users.

Some public interest exists for the development of public access in the form of a park along the Fall River at the site of a breached dam in Bernardston Center (Cohen, 2001).

The natural, scenic, and historic assets of the Connecticut River are spurring a number of partnerships and initiatives throughout the watershed that can eventually increase tourism within this Reach. Programs are underway to create a four-state water trail that would extend "from the source to the sea". A water trail currently exists in New Hampshire and Vermont and has more than a dozen primitive camping sites along the river. The Connecticut River has been designated as an American Heritage River. In 1998, the Connecticut River Valley Special Resource Reconnaissance Study assessed the region's historic, cultural and natural assets, and discussed several options, including designation of the Valley as a National Heritage Corridor or National Heritage Area. One of the priorities of the Connecticut River Strategic Plan (2001) is to pursue a National Heritage Corridor designation. Proposals are also underway for a Connecticut River Scenic Farm Byway.

Access Points and Recreational Areas Open to the Public within the Northern Reach

Visitors/Educational Centers
Great Falls Discovery Center (Turners Falls)
Northfield Mountain Recreation & Environmental Center

Canoe Launch Sites
Pauchaug Public Access Board Facility
Munn's Ferry Boat Camping
Riverview Canoe Shuttle Drop-Off
Barton Cove Public Boat Ramp
Barton Cove Campground & Canoe Shuttle
Poplar Street Canoe Access, Montague (Northeast Utilities Portage Area)

Camping:
Barton Cove Campground
Munn's Ferry Boat Camping

State Parks/Forests/Other Recreation Areas:
Erving State Forest (Gill)
Northfield State Forest
Catamount State Forest (Leyden)

Hiking/Nature/Bike/Cross-Country Skiing Trails:
Barton Cove Nature Trail
Bennett Meadow WMA
Northfield Mountain Recreation & Environmental Center
Pauchaug WMA
Franklin County Bikeway (proposed)

Natural/Scenic Resources
The French King Gorge (Gill and Erving)
Wanamaker Lake (Northfield)
Rose Ledges (Northfield)
Satan's Kingdom (Northfield)
Montague Sand Plains (Montague)

Public Access and Recreation Objectives and Priority Actions:

There are a number of public access and recreational challenges and opportunities for communities within the Northern Reach of the Watershed. The area's vast amount of open space, rivers and streams provide many recreational opportunities for both residents and visitors. The need to balance recreational use with the protection of wildlife and sensitive habitats is critical. Public educational materials on the natural, cultural and historic assets of the region can both increase public interest and stewardship in the area. While ample public access exists along the Mainstem of the Connecticut River in the Northern Reach, opportunities may exist for increasing recreational access along the Connecticut River's tributaries.

Objectives:

- Reduce impacts from recreational use on wildlife and sensitive habitat along the mainstem of the Connecticut River.

- Expand recreational access along the major tributaries of the Connecticut River within the Northern Reach where appropriate.

Priority Actions:

- **Complete an updated inventory of existing boat access points in the Northern Reach.** The last inventory was completed by the Connecticut River Watershed Council in 1990 (Sanford, 2001). This can be used to provide updated information about the use of each site and whether additional access sites are needed.

- **Implement an education program for boaters**. Education materials should be developed to inform boaters about the potential adverse impacts of boats on wildlife and habitat and erosion along the river as well as preventing the spread of invasive species by properly cleaning boats. Outreach should consist of posting signs and distributing informational brochures.

- **Assist with the development of a public access point at the breached dam site on the Fall River in Bernardston Center**. This should consist of assisting interested residents in developing a plan for the site and identifying potential funding sources. The project could serve as a valuable demonstration project that would be helpful in educating the public about the removal of dams and the restoration of degraded riparian areas following storm damage.

CHAPTER 2 : THE CENTRAL REACH

The following chapter details the result of the assessment, determination of priorities and the development of a five-year action plan for the Central Reach of the Connecticut River Watershed in Massachusetts, which extends from the Turners Falls Dam to the Holyoke Dam (Map 2.1). Due to the overlap in political jurisdictions, nearby areas in the communities of Montague, South Hadley and Holyoke are illustrated in this section's maps.

RIPARIAN CORRIDORS

Assessment Findings:

The Connecticut River Strategic Plan (Pioneer Valley Planning Commission, 2001) indicates that streambank erosion along the Connecticut River mainstem has been identified as problem. This erosion poses a threat to freshwater fisheries and riparian buffer habitats, and contributes to the loss of prime agricultural lands. Erosion along the mainstem and tributaries increases turbidity and diminishes water quality through sedimentation. A lack of streambank vegetation can contribute to erosion problems. Vegetated riparian buffers can play an important role in preventing erosion as well as protecting water quality, water temperature and wildlife habitat.

Vegetated riparian buffers have been lost or degraded by encroaching development and agricultural practices. The State's Rivers Protection Act currently provides protection of vegetated riparian buffers by restricting activities within a certain distance of rivers in both rural and urban settings. Currently degraded vegetated riparian buffers are most likely those that are in close proximity to high intensity land use such as agricultural, commercial and industrial uses. Map 2.1 provides an overview of the locations of various land uses within the Central Reach. The map provides a preliminary indication of where non-existent or degraded vegetated riparian buffers are located. Agricultural lands also directly abut the Connecticut River and its major tributaries in the Central Reach in areas with minimal riparian buffers. Additional detailed assessments and field investigations will be needed to identify the specific condition of riparian buffers in these areas. The preliminary assessment does, however provide an initial identification of areas to focus further work on. Riparian buffers that do not appear to be impacted by adjacent land uses are located in the upper reaches of the Fort, Sawmill, Mill-Hatfield, Mill-Northampton, and Manhan Rivers as well as Bachelor Brook.

Riparian Corridor Objectives and Priority Actions:

The assessment methodology used for the riparian buffers in the Central Reach provides an attempt at identifying the geographic locations of riparian buffers that may need protection or restoration. The use of GIS datalayers provides only a cursory, initial step to assess and prioritize riparian buffers. The assessment results provide a geographic prioritization that can be used to perform a detailed survey to determine the actual condition of riparian buffers. The overall priorities for riparian buffers determined by the assessment include the following.

Objectives:

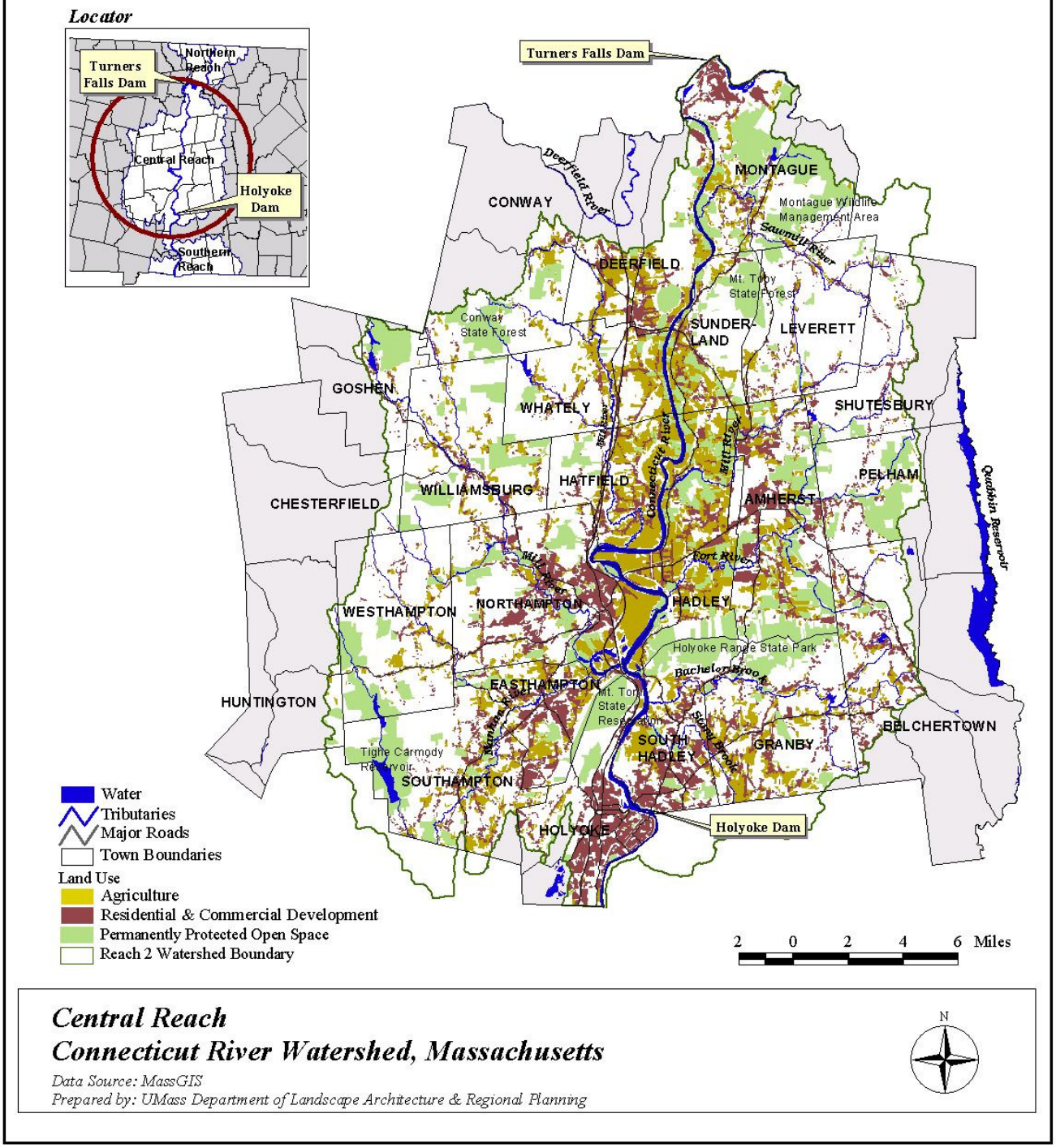
- Increase protection and restoration of riparian buffers in the Central Reach.
- Reduce human-influenced erosion along the Connecticut River and its major tributaries.
- Control invasive plant species within the riparian buffers of the Central Reach.
- Increase public awareness of the importance of riparian corridors as wildlife habitat and protection of water quality and erosion prevention.

Priority Actions:

- **Encourage enhancement of vegetated buffers on riverside properties undergoing redevelopment.** Promote improvement of vegetated riparian buffers under 310CMR10.58(5) of the Wetlands Protection Act Regulations. These efforts may be helpful in restoring degraded vegetated riparian buffers in areas that have been previously developed. Actions to improve the riparian buffers would be taken by individuals as part of redevelopment activities.
- **Complete riparian corridor restoration projects**. Restore and enhance the vegetated riparian buffers that have been impacted by land use especially where there is a lack of a vegetated buffer.
- **Implement a Riparian Corridor Educational Program for landowners, farmers and local citizens**. The program should focus on teaching the importance of riparian buffers in protecting water quality and providing wildlife habitat and how they can be protected and restored. Educational materials should be developed for different audiences such as farmers and local residents.
- **Complete erosion restoration/mitigation demonstration projects**. Coordinate with the Connecticut River Watershed Council's Sustainable Riverbanks Project to identify and restore an appropriate demonstration site(s).
- **Identify erosion sites along the major tributaries of the Connecticut River in the Central Reach**. Coordinate with interested parties to identify and restore an appropriate demonstration site(s).
- **Continue to support efforts to control invasive plant species within riparian buffers.** Coordinate efforts by the Conte Wildlife Refuge, Nature Conservancy, and other organizations to address the management of invasive/exotic species.

Map 2.1

Central Reach, Connecticut River Watershed (MA)



WATER QUALITY AND NONPOINT SOURCE POLLUTION

Water Quality Information:

Relatively little information exists about the state of water quality within the Central Reach. The Connecticut River Basin 1998 Water Quality Assessment Report provides a compilation of known information for the entire mainstem watershed. Only 14% of the named rivers and 44% of the total river miles within the watershed were assessed (Kennedy & Weinstein, 2000). Of the seventeen river and stream segments listed in the report for the Central Reach, only two of the segments yielded enough information for the state to complete an assessment to determine if they were meeting all designated use goals for fish habitat and recreational uses.

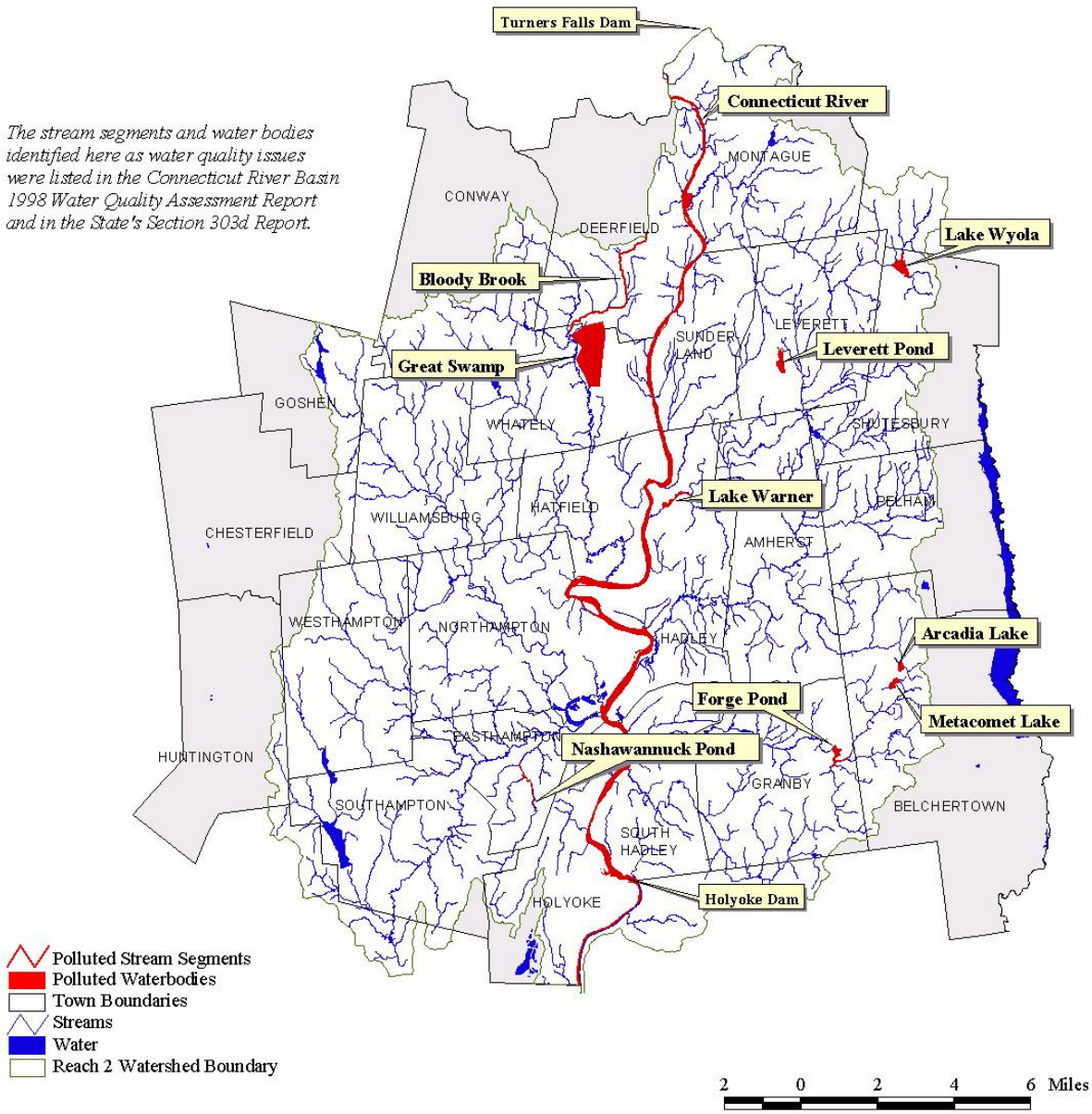
Most of the Central Reach stream segments listed in the Connecticut River Basin 1998 Water Quality Assessment Report were identified through the state's Section 303d Report which identifies waterbodies not currently meeting their specified water quality standards. The most recent report was completed by the state in 1998 and listed the following stream segments, lakes, and ponds in the Central Reach that do not meet water quality standards (Kennedy & Weinstein, 2000). Map 2.2 provides a graphic representation of the location of these water quality issues.

Stream Segment/Lake	**Pollutants/Stressors**
Arcadia Lake, Belchertown	nutrients, noxious weeds
Forge Pond, Granby	nutrients, noxious weeds
Ingraham Brook Pond, Granby	noxious weeds
Leverett Pond, Leverett	noxious weeds, turbidity
Metacomet Lake	organic enrichment, low dissolved oxygen (d.o.)
Nashawannuck Pond, Easthampton	nutrients, low d.o., noxious weeds
Lake Warner, Hadley (Mill River)	nutrients, low d.o., noxious weeds, turbidity
Lake Wyola, Shutesbury	nutrients, low d.o., noxious weeds
Connecticut River	priority organics, pathogens
Weston Brook, Granby	ammonia, chlorine, nutrients, low d.o., pathogens
Lampson Brook, Belchertown	ammonia, chlorine, nutrients, low d.o.
Aldrich Lake, Granby	noxious weeds

The Connecticut River Basin 1998 Water Quality Report cites the need for additional water quality monitoring within the watershed (DEP, 2000). Additional water quality monitoring may uncover additional water quality issues within the watershed. An example of this is the fact that two tributaries in the Reach were identified by Smith College in their Mill River-Hatfield Study as having impaired water quality. These areas are Bloody Brook in Deerfield and Great Swamp in Whately. The report states that the source of the pollution in these areas is nonpoint source runoff from residential, agricultural, and commercial development (Rhodes and Sanders, 2000). It is important to note that the Silvio O. Conte National Fish and Wildlife Refuge identifies Great Swamp as a special focus area because of its habitat value (U.S. Fish and Wildlife Service, 1995).

Map 2.2

Identified Water Quality Issues



Central Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

Threats to First Order Streams:

Since the majority of development within the Central Reach has occurred along the Connecticut River the majority of first order streams in the adjacent hills are relatively undisturbed. Examination of MassGIS datalayers indicates that a large amount of unprotected undeveloped land exists in the headwaters of the Connecticut River's major tributaries in the Central Reach. Future development of this unprotected land could threaten water quality both in streams and tributaries to the Connecticut River as well as in public drinking water supplies.

Drinking Water Quality Issues:

A significant amount of the land and tributary streams within the Central Reach are dedicated to providing drinking water. Map 2.3 identifies the major surface and groundwater drinking supplies within the Reach. Although portions of the watersheds of the reservoirs are municipally owned and have some level of protection from development, significant portions of them are not protected. Several reservoirs already have small amounts of residential and agricultural development within their respective recharge zones based on a review of orthographic photographs. The Source Water Assessment Program currently being conducted by the state will assess threats to water quality within public drinking water supplies and provide technical assistance for the mitigation of these threats (Skiba, 2001).

Groundwater supplies within the Central Reach are also susceptible to adverse affects from development based on an evaluation of available GIS data. A large number of public drinking wells are present within the developed portions of the Reach. Historically, land use practices above groundwater aquifers have resulted in contamination of drinking water. Whately, for example, experienced pesticide contamination in one of its wells due to agricultural land use. The Source Water Assessment Program currently being conducted by the state will assess threats to the public drinking water supplies within the Reach and provide technical assistance for the mitigation of these threats (Skiba, 2001). Additionally, water supply protection overlay zoning districts are being implemented within several communities in the Reach.

Nonpoint Source Pollution Assessment Findings:

Several sources of information were valuable in identifying areas of concern for nonpoint source pollution in the Central Reach. The reports that proved to be most valuable included the Connecticut River Basin 1998 Water Quality Assessment Report, the Connecticut River Strategic Plan, and the Mill River-Hatfield Study Report prepared by Smith College. Following the review of reports, GIS datalayers and orthographic photos were evaluated in order to identify and prioritize potential areas of non-point source pollution within the Central Reach based on the amount of developed areas and agricultural land use.

The review of existing planning reports identified three areas of known nonpoint source pollution or areas where potential pollution is a particular concern. These areas are described below.

1. Bloody Brook, Deerfield and Great Swamp, Whately: The Mill River Study report identified this area as having impaired water quality due to urban and agricultural runoff. This report offers only a preliminary indication of the status of water quality in this area. Additional work will need to be done to verify information.

2. Nashawannuck Pond, Easthampton: The Connecticut River Basin 1998 Water Quality Assessment Report states that a Section 319 Non-point source Pollution abatement project is ongoing in the pond's watershed to reduce sediment and nutrient loadings from urban runoff (Kennedy & Weinstein, 2000).

3. Lake Warner (Mill River-Hadley): The lake is identified in the state's Section 303d Report as having nutrient enrichment. A possible source of the nutrients is from non-point source runoff from agricultural lands located upstream from the lake.

4. Barnes Aquifer (Easthampton, Holyoke): The aquifer is designated as a sole source drinking water aquifer for the Town of Easthampton (O'Leary, 2001). The aquifer is vulnerable to pollution from runoff from developed areas located above it.

The evaluation of GIS datalayers and orthographic photos resulted in the identification of the following potential non-point source pollution areas along with possible sources of pollution.

1. Mill River-Northampton: Urban Runoff
2. Fort River: Urban and Agricultural Runoff
3. Connecticut River, Holyoke-South Hadley: Urban Runoff

The areas listed above are areas of know or suspected water quality issues. As previously stated, many of the water bodies within the watershed have yet to be assessed. It is likely that additional areas of water quality problems will be identified with the completion of additional assessment work.

Water Quality and Nonpoint Source Pollution Objectives and Priority Actions:

Based on the assessment performed, the following objectives and priority actions were developed to address water quality and quantity issues within the Central Reach.

Objectives:

- Conduct additional water quality monitoring throughout the Connecticut River Mainstem and its tributaries.

- Reduce nonpoint source pollution along the Connecticut River and its tributaries.

- Increase level of protection for headwater streams throughout the Central Reach of the Watershed.

- Increase public involvement in watershed protection and improvement

Priority Actions:

- **Reclassify eligible headwater streams as "Outstanding Resource Waters" or "Cold Water Fisheries".** Use reclassification to provide additional level of protection for streams. Coordinate this action with the Departments of Environmental Protection and Fisheries and Wildlife. The Department of Fisheries and Wildlife has a list of streams that would be eligible for classification as cold-water fisheries.

- **Develop a Regional Open Space Protection Strategy focused on Water Quality Protection**. This action would involve coordinating with local land trusts, regional planning commissions and state agencies to develop a land protection strategy that protects headwater streams and aquifers.

- **Establish additional Stream Teams within the Central Reach**. A likely candidate would be the Fort River in Hadley and Amherst. A number of existing environmental groups as well as academic institutions are located within the watershed and could be potential partners.

- **Develop a Reach-wide Water Quality Monitoring Program**. Use GIS-based land use analysis to prioritize subwatersheds for monitoring. Establish partnerships between federal, state and local agencies as well as volunteer groups to increase capacity for completing monitoring. Monitoring will consist of sampling for both chemical parameters and biological indicators

- **Implement outreach and education to local communities on Stormwater Management Issues**. Efforts should be focused on assisting with the NPDES Phase II Stormwater permitting program, the Stormwater Management Policy under the State's Wetland Protection Act and the establishment of local utilities.

- **Complete Nonpoint Source Pollution Reduction Demonstration Projects**. This action would consist of identifying property owners willing to participate in reduction of runoff from impervious surfaces on their property.

WATER QUANTITY

The development of drinking water supplies has resulted in the modification of flow within certain streams, rivers and aquifers within the Central Reach. Few if any of the dams have the ability to release water at predetermined rates. Two reports that were reviewed identified areas of possible flow modification caused by drinking water supply development. The Connecticut River Basin 1998 Water Quality Assessment Report and the Mill River Study Report both state that two tributaries to the Mill River-Hatfield, West Brook and Roaring Brook, experience no flow conditions during extended dry periods (Kennedy & Weinstein, 2000). The Massachusetts Department of Environmental Protection is currently addressing the issue of over withdrawals from West Brook (Kennedy & Weinstein, 2000). Less is known about the impacts of other surface water drinking reservoirs on downstream conditions.

An evaluation of GIS datalayers was performed to determine other possible tributaries in the Central Reach that may be experiencing flow modification due to the development of surface drinking water supplies. Tributaries that have surface water supply development and groundwater aquifers with several public supply wells were identified as possibly experiencing flow modification. These include the following tributaries that are graphically represented in Map 2.4.

Roaring Brook (Mill-River-Hatfield)
Beaver Brook (Mill River-Hatfield)
Marble Brook (Mill River-Northampton)
Cushman Brook (Mill River-Hadley)
Hop Brook (Fort River)
West Brook (Mill River-Hatfield)
Running Gutter Brook (Mill River-Hatfield)
Manhan River (upper reaches)
Amethyst Brook (Fort River)

In addition to the development of drinking water supplies, hydroelectric generation projects along the mainstem of the Connecticut River affect streamflow. Recent improvements to the Holyoke Dam have reduced the impacts of water level fluctuation in the Holyoke Pool (Holyoke Water Power Company, 2000). Future development within the Central Reach may have significant adverse effects on the quantity of water available for meeting human and ecological needs.

Water Quantity Objectives and Priority Actions:

Objectives:

- Identify current and potential future adverse impacts of drinking water supply development on streams and other hydric ecosystems within the Central Reach.

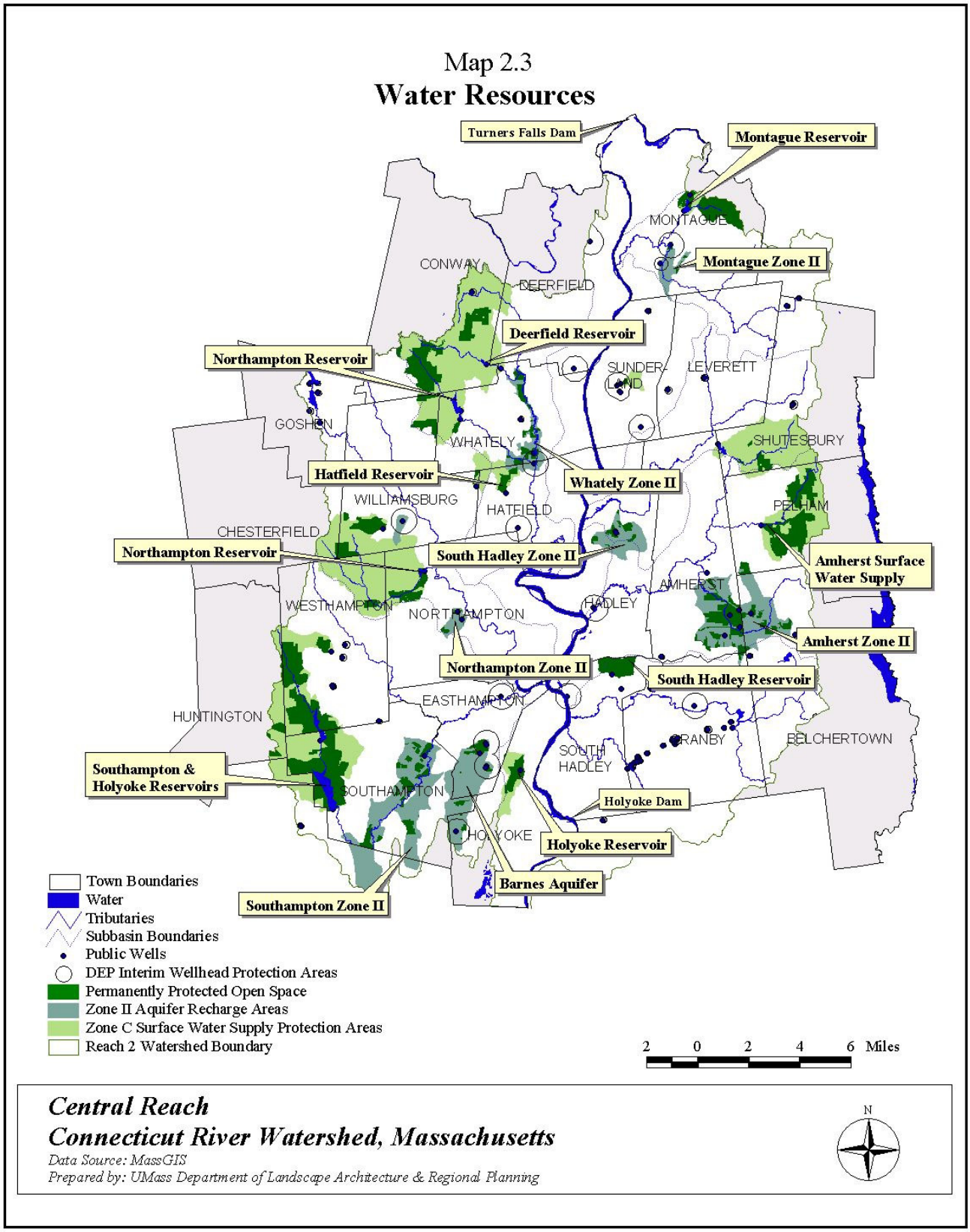
- Reduce impacts of hydroelectric generation projects on water level fluctuations on the mainstem of the Connecticut River.

Priority Actions:

- **Conduct flow modification assessments on tributaries below public water supply withdrawal points (both surface and ground).** This will involve coordinating with federal and state agencies to develop an assessment protocol and to identify volunteer groups and other partners to conduct the assessments.

- **Determine impacts of future development on water supplies**. Use the Buildout Data generated by the EOEA to estimate the amount of drinking water needed to support buildout population and compare with information on known amount of available water.

- **Assist with the implementation of drinking water source protection recommendations developed under the Source Water Assessment Program for the Central Reach.** This may include assisting with outreach to communities about the program and the implementations of recommendations to protect drinking water quality in the reports generated by the Department of Environmental Protection.


Map 2.3
Water Resources
Turners Falls Dam
Montague Reservoir
MONTAGUE
Montague Zone II
CONWAY
DEERFIELD
Deerfield Reservoir
Northampton Reservoir
SUNDERLAND
LEVERETT
GOSHEN
WHATELY
SHUTESBURY
Hatfield Reservoir
Whately Zone II
WILLIAMSBURG
HATFIELD
PELHAM
CHESTERFIELD
Northampton Reservoir
South Hadley Zone II
Amherst Surface Water Supply
AMHERST
WESTHAMPTON
NORTHAMPTON
HADLEY
Amherst Zone II
Northampton Zone II
South Hadley Reservoir
EASTHAMPTON
HUNTINGTON
GRANBY
BELCHERTOWN
SOUTH HADLEY
Southampton & Holyoke Reservoirs
SOUTHAMPTON
Holyoke Dam
HOLYOKE
Holyoke Reservoir
Barnes Aquifer
Southampton Zone II
Town Boundaries
Water
Tributaries
Subbasin Boundaries
Public Wells
DEP Interim Wellhead Protection Areas
Permanently Protected Open Space
Zone II Aquifer Recharge Areas
Zone C Surface Water Supply Protection Areas
Reach 2 Watershed Boundary
2 0 2 4 6 Miles
Central Reach
Connecticut River Watershed, Massachusetts
Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning
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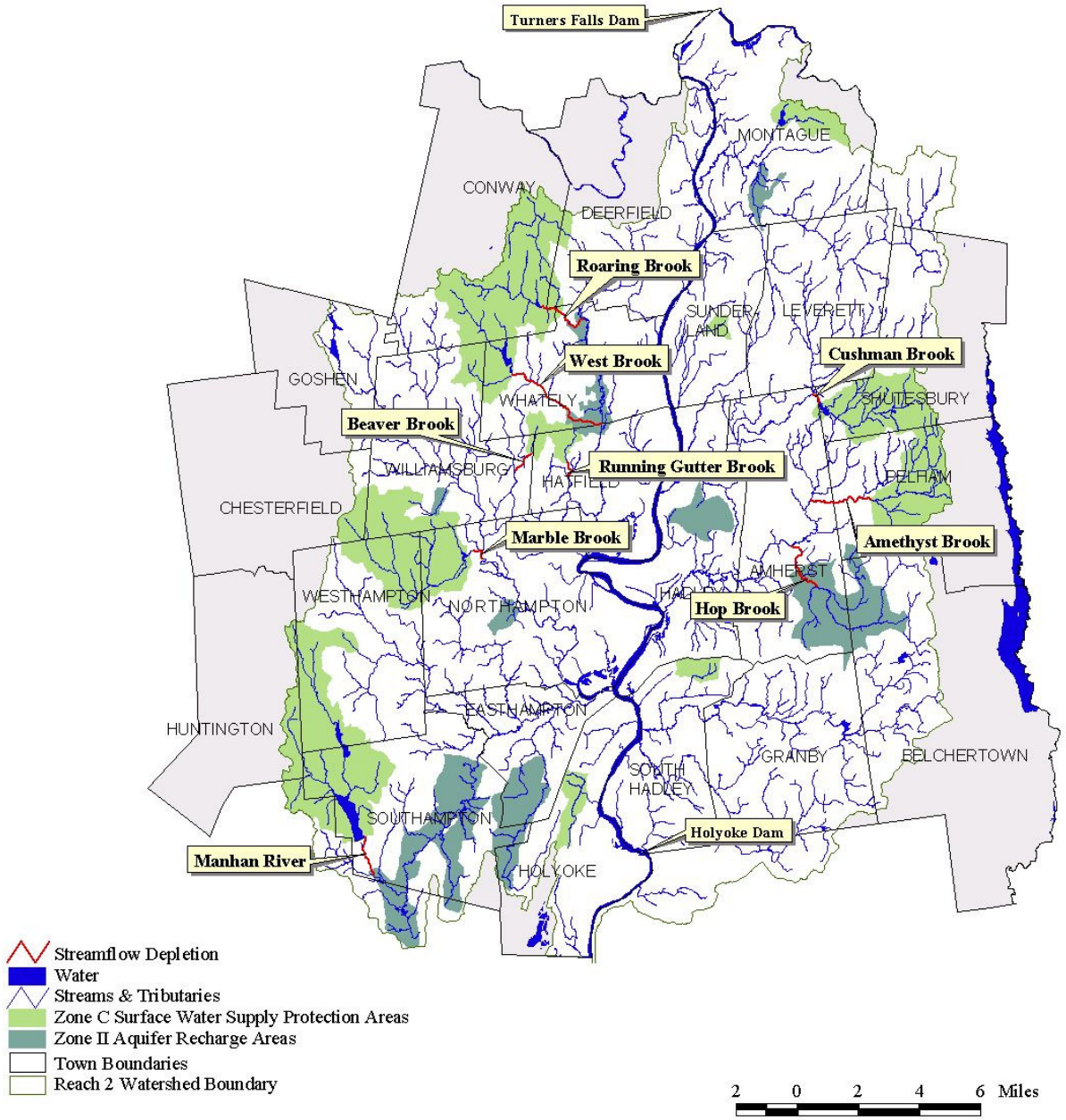
Map 2.4

Potential Water Quantity Issues



Central Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

WILDLIFE HABITAT AND FISH PASSAGE

The Central Reach of the Connecticut River Watershed contains habitat for numerous species of plants and wildlife, some of which are listed as endangered by the state and/or federal government. Fortunately, the Pioneer Valley has a long history of land protection and it is currently estimated that over 30,000 acres are protected from further development (based on a calculation using GIS information provided by MassGIS). The Department of Environmental Management (DEM) is also very active in land acquisition and protection within the Central Reach (Blunt, 2001).

Assessment Findings:

The major planning study containing information about wildlife habitat within The Central Reach is the *Action Plan and Environmental Impact Statement for the Silvio O. Conte National Fish and Wildlife Refuge* prepared by the U.S. Fish and Wildlife Service in 1995. This report contained an identification of important wildlife habitats throughout the entire four-state Connecticut River Watershed as well as protection priorities.

An examination of GIS data was also conducted to identify the occurrence locations of endangered species, estimated habitats of rare or endangered species, contiguous natural lands, protected open space and the newly released Massachusetts Biomap layer. The Biomap represents the state's identification of important wildlife habitat areas that should receive consideration for protection strategies. The GIS datalayers were evaluated to determine priority areas for future protection. In determining the priorities for wildlife protection, the following criteria were used:

The results of the wildlife habitat assessment are illustrated in Map 2.5. The map provides a graphic representation of the important wildlife habitat areas within the Central Reach that are currently unprotected. The review of existing planning reports identified additional wildlife habitat areas that are targeted for protection by federal, state and local agencies. In determining which wildlife habitat areas should receive priority for protection, the results of the GIS data analysis, consideration of the criteria discussed above and the information obtained from the review of existing planning studies were synthesized. The resulting wildlife habitat priority areas emerged from the assessment.

- Mt. Tom/Mt. Holyoke Range: According the Silvio O. Conte National Fish and Wildlife Action Plan, this area contains a large amount of contiguous forestland and a wealth of biodiversity, including many migratory land birds.

- Mill River Hatfield: This river contains the endangered dwarf wedge mussel. Though portions of the river are protected, more action needs to be taken to protect this valuable habitat.

- Connecticut River from Turner's Falls to the Rt. 116 Bridge: The remaining sites along this stretch of the river that are not already protected are a high priority for protection (U.S. Fish & Wildlife Service, 1995). This area contains the largest freshwater mussel population along the river, and over thirty rare plant and animal species.

- Mt. Toby: The habitat on Mt. Toby harbors about 20 rare plant and animal species. To preserve this area key parcels still need to be protected. Mt. Toby also presents a superb opportunity to connect the protected forestland all the way to the river. The DEM has identified Mt. Toby as a top priority in its land acquisition plan (Blunt, 2001).

- The Hatfield Oxbow: Containing 500 acres of wetlands and an ancient oxbow, as well as 700 acres of agricultural land, the Hatfield Oxbow represents could provide grassland bird habitat. The oxbow

serves as the nursery grounds for young shad and blueback herring, and two rare plant species occur here (U.S. Fish & Wildlife Service, 1995).

- The Whately Great Swamp: This is the best remaining example of the hemlock/red maple swamp community that resulted from the glacial activity in Lake Hitchcock. The Conte Plan has identified it as important breeding habitat for migratory land birds.

- Rainbow Beach: This area contains a significant population of the globally rare Puritan Tiger Beetle.

It is important to note that with the purchase of the Floodplain Forest in Hadley by the Department of Fisheries, Wildlife and Environmental Law Enforcement an improved connection between the Mt. Holyoke Range and the Connecticut River now exists.

Fish Passage Assessment:

The largest barrier to fish migration in this region is the prevalence of dams both along the mainstem of the Connecticut River and its tributaries. Many of these dams no longer serve any useful purpose (U.S. Fish and Wildlife Service, 1995). However, the issue of dam removal is a difficult and contentious one since many of the dams have been in existence for as long as people have inhabited the region. Communities grew up surrounding these dams, and the dams and their millponds are now considered by many to be an essential part of the community's character. Much public education about the affects of dams on fish migration needs to take place before improvements can be made. The following are the dams in the Central Reach as identified in the *Connecticut River Strategic Plan* and the *Strategic Plan for the Restoration of Atlantic Salmon*.

Connecticut River	Holyoke Dam	Holyoke
	Turner's Falls Dam	"
Manhan River	Northampton St. Dam	Easthampton
Mill River-Hatfield	Advocate Dam	Hatfield
Roaring Brook	Roaring Brook Dam	Conway
	S. Deerfield Water Supply Dam	Whately
Mill River- Northampton	Route 110 Dam	Northampton
	Paradise Pond Dam	"
	Mill River Dam	"
	Vistron Dam	"
	Rocky Pond Dam	"
	Country Club Pond Dam	"
	Button Shop #1 and 2 Dams	"
	Chartpak Dam	Williamsburg
	Brass Mill Pond Dam	"
	Near Graham Pond Dam	"

Fish passage facilities have been installed at the Holyoke Dam and are planned for the Northampton Street Dam on the Manhan River as well as two dams on Stoney Brook in the Mount Holyoke College Campus (PVPC, 2001; Sanford, 2001). In addition to dams, culverts under roads have been identified as a barrier to fish migration. To date, no detailed studies have completely addressed this issue. Additional assessment work is needed to fully identify impedances to fish migration in the Central Reach including dams, culverts and road crossings.

Wildlife Habitat and Fish Passage Objectives and Priority Actions:

EOEA can play an important educational role in the protection of wildlife habitat within the watershed. By educating local officials and residents about the importance of preserving wildlife habitat, the team can play an essential supporting role. Numerous federal and state agencies as well as non-profit groups are involved in the regulation of dams and improvement of fish passage throughout the watershed. Again, the most valuable role that EOEA can serve is to provide assistance and support to those groups and agencies who are directly involved in the improvement of fish passage.

Objectives:

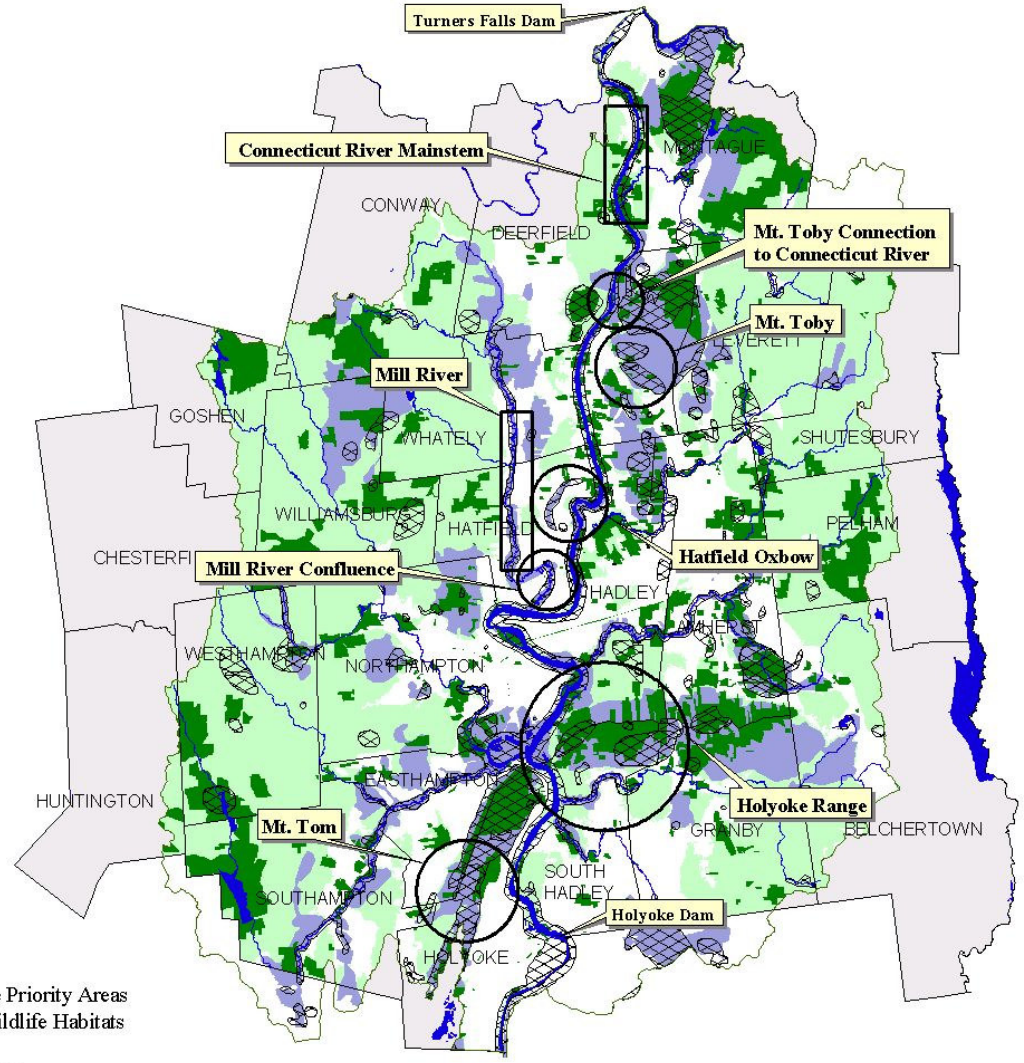
- Build support for the protection of wildlife habitat throughout the Central Reach of the Watershed
- Support efforts to improve fish passage throughout the Central Reach of the Watershed.

Priority Actions:

- **Initiate watershed-wide public awareness promotion on rare and endangered species.** This will consist of partnering with federal and state agencies to provide educational materials and outreach to the public about the importance of protecting wildlife habitat.
- **Support efforts to improve fish passage by acting as liaison between local interest groups and federal and state agencies.** Provide assistance to local non-profit and volunteer groups as well as local communities who are interested in improving fish passage at specific locations.
- **Implement the recommendations of the Stream Continuity Project.** Focus on removing barriers to fish passage and wildlife movement along river and stream corridors.

Map 2.5

Wildlife Habitat Priority Areas



Central Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

PUBLIC ACCESS AND RECREATION

The Connecticut River and its tributaries provide numerous recreational opportunities. Though not without negative impacts, public access has the potential to transform people's concept of the river and help build support for environmental projects. The goal of a watershed protection plan should thus be to provide a balanced variety of recreational and educational opportunities and encourage appropriate use of the river and its tributaries consistent with resource protection goals.

Assessment Findings:

Currently, the amount and type of public access on the Connecticut River varies throughout the Central Reach. In the southern section of the Central Reach alone, there are four marinas and three public ramps that collectively support numerous powerboats. Because this type of boat is limited to fairly deep water, the most intense use occurs in the stretch of the river from about a mile north of Elwell Island to the Holyoke Dam. The high degree of use in this area has resulted in disturbances of wildlife habitat, streambank erosion, and a general overcrowding of the river (Pioneer Valley Planning Commission, 2001). Officials have recently been successful in preventing camping at Rainbow Beach that hosts a colony of endangered Puritan Tiger Beetles (Blunt, 2001). The prevalence of powerboats in this area also presents difficulty for non-motorized boaters, with large boat wakes creating an atmosphere not conducive to paddling.

In contrast, the northern section of the Central Reach that has been designated as the Connecticut River Water Trail is relatively shallow and quiet. It is ideal for paddling and car-top boats, which are increasingly popular with the general public (Connecticut River Watershed Council, 1986). The speed limit has been reduced in this stretch of the river to encourage paddle-powered boats. A priority for the Connecticut River Water Trail is to develop campsites accessible to canoers and kayakers. There are currently no legal campsites for users; thereby the trail is limited to day trips only. With no designated campsites, illegal camping occurs without consideration for trespassing on private property or disturbing wildlife habitat (Blunt, 2001).

The Connecticut River is home to over thirty state or federally listed endangered species including the Dwarf Wedge Mussel and the Puritan Tiger Beetle (Massachusetts Department of Environmental Management, 1999). Clearly, unbridled public access to the river is likely to adversely affect the habitat of these species, whether in the form of high boat wakes eroding river banks or soaking newly formed dragonflies, or simply by hiking or camping on beaches (Cohen, 2001). Improving public access in certain areas of the river could exacerbate these conditions and create an increased threat to already vulnerable species. These concerns need to be taken into consideration in any alteration of the natural habitat or any facilitated access point.

Public Access and Recreation Objectives and Priority Actions:

Based on the results of the public access assessment as well as input from the public, the following public access improvement objectives and priority actions were determined for the Central Reach. (See Map 2.6).

Objectives:

- Increase awareness of the impacts that recreational use can have on the environmental quality of the watershed.

- Work towards the realization of a multi-state Water Trail along the Connecticut River.

Priority Actions:

- **Create designated primitive campsites along the Connecticut River Water Trail in the northern section of the Reach.** Two primitive campsites accessible only by boat would prevent much of the misuse that would accompany a formal site. It would be easier to design and implement, and is a more feasible objective for the next five years.

- **Develop an additional car-top boat access along the Connecticut River Water Trail.** The site would be located North of the Route 116 Bridge in the Sunderland-Deerfield area. By decreasing the distance between access points, users would have more options for short river trips. The location of the site should be in an area that would have minimal impact on wildlife habitat.

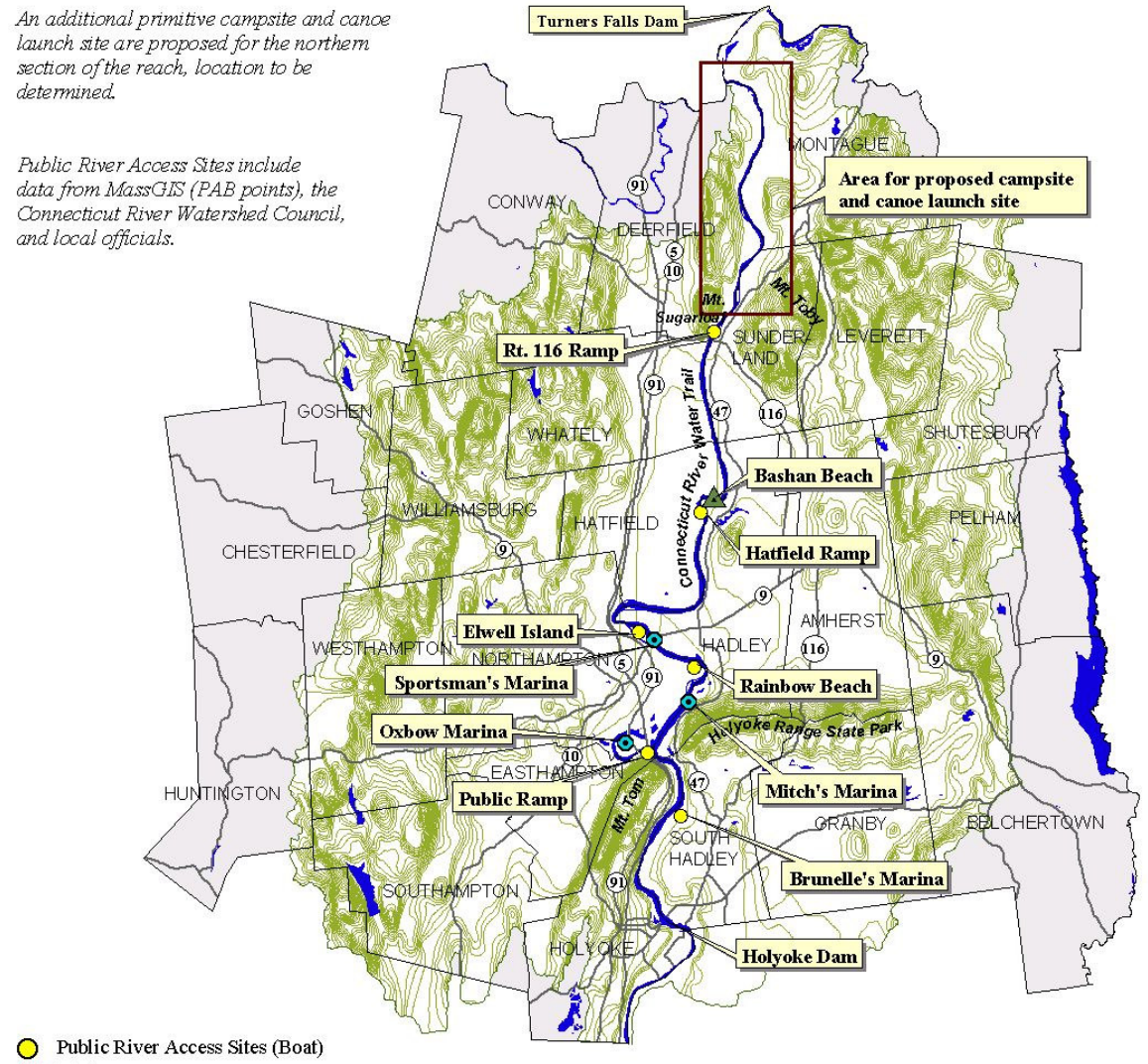
- **Implement a recreational user education program**. Education materials should be developed to inform boaters and others about the potential impacts of recreation on wildlife and habitat along the river as well as preventing the spread of invasive species by properly cleaning boats. Outreach efforts should consist of posting signs and distributing informational brochures.

Map 2.6

Public River Access Plan

An additional primitive campsite and canoe launch site are proposed for the northern section of the reach, location to be determined.

Public River Access Sites include data from MassGIS (PAB points), the Connecticut River Watershed Council, and local officials.



Central Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

CHAPTER 3 : THE SOUTHERN REACH

The Southern Reach extends from the Holyoke Dam to the Connecticut State line and is the most urbanized area of the Watershed (Map 3.1). This southernmost Reach has been subject to intensive development. The largest city in the Southern Reach is Springfield. The other cities and towns include South Hadley, Granby, Holyoke, Chicopee, West Springfield, Agawam, Longmeadow, Wilbraham, Hampden and East Longmeadow. Adjacent areas in South Hadley, Granby and Holyoke are shown in the maps in this section for coordination purposes. Natural features such as rivers, streams, riparian corridors and habitat areas, are limited in the Southern Reach and they have been severely affected by adjacent urbanization.

RIPARIAN CORRIDORS

Assessment Findings:

Restoration and maintenance of riparian buffers are essential for improving and maintaining water quality, water temperature and benthic habitat. Connectivity is important to the success of habitat improvement in streams. Vegetated riparian buffers along the main stem of the Connecticut River within the highly urbanized areas of the Southern Reach have been severely degraded and lost due to encroaching development (see Map 3.2). Riparian buffers appear to be minimal in the urbanized areas of Holyoke, Chicopee, West Springfield and Springfield. Riparian buffers along the tributaries of the Connecticut River are generally more substantial within the suburban and undeveloped areas of the Reach such as in the communities of East Longmeadow, Hampden and Wilbraham.

Invasive plant species are commonly found within riparian buffers in the Southern Reach. Management of invasive plants should be undertaken to the extent possible, in particular where new, funded projects are being carried out. An opportunity exists to improve the quality and density of vegetation by removing invasive plant species that would result in improved wildlife habitat quality and erosion control functions.

Significant riparian buffers and wildlife habitat do remain at the confluence points of the Connecticut River and several of its tributaries based on preliminary field investigations and a review of relevant planning studies. Examples include the Chicopee and Westfield Rivers as well as Bagg Brook in West Springfield and Tannery Brook in Holyoke. The heavily urbanized character of the remainder of the Reach and loss of riparian corridors underscores the need to protect and where needed restore the riparian areas at the confluence points, as well as maintain riparian buffers in upstream areas.

Riparian Corridor Objectives and Priority Actions:

The restoration and enhancement of riparian buffers should be focused at the confluence points of the mainstem of the Connecticut River and its major tributaries (Map 3.2). The high priority points are the confluence points of rivers and streams such as the Chicopee River, Westfield River, Tannery Brook and Bagg Brook. Significant riparian buffers exist at some of these confluence points and should be a priority for protection. Other confluence points such as the Mill River have been altered through channelization and should be restored if possible. Efforts should also be made to improve and restore riparian buffers elsewhere in the Reach especially as part of the redevelopment of sites along the area's streams and rivers. Where possible, efforts should be made to reduce the amount of impervious surfaces within the riparian zone, particularly in areas identified through the analysis of GIS landuse data. Restoration of connective riparian buffer corridors between existing tracts of wildlife habitat within the watershed is recommended in the Connecticut River Strategic Plan (PVPC, 2001). Connections should be made within the Southern Reach between the large habitat areas in the northern sections of Granby and South Hadley in the Holyoke Range, western Holyoke and in the Town of Agawam. In upper reaches of the Mill River Watershed where extensive riparian buffers remain, pro-active steps should be taken to protect existing vegetated buffers. In more developed areas, the removal of impervious surfaces within 50 feet of streams and investigation of "functional replacements" for impervious surfaces within 100 feet of streams, as previously discussed, should be followed by the re-establishment of riparian vegetation.

Objectives:

- Protect remaining vegetated riparian corridors at the confluence points of the Connecticut River and its tributaries.

- Encourage restoration of vegetated riparian corridors throughout the Southern Reach especially during the redevelopment of sites along rivers and streams.

- Minimize impacts on riparian vegetation from urban and suburban development throughout the Southern Reach.

Priority Actions:

- **Control invasive plant species throughout the Southern Reach**. Identify areas where invasive plants exist and work with partners such as the Silvio O. Conte Fish and Wildlife Refuge and volunteer groups to implement control strategies.

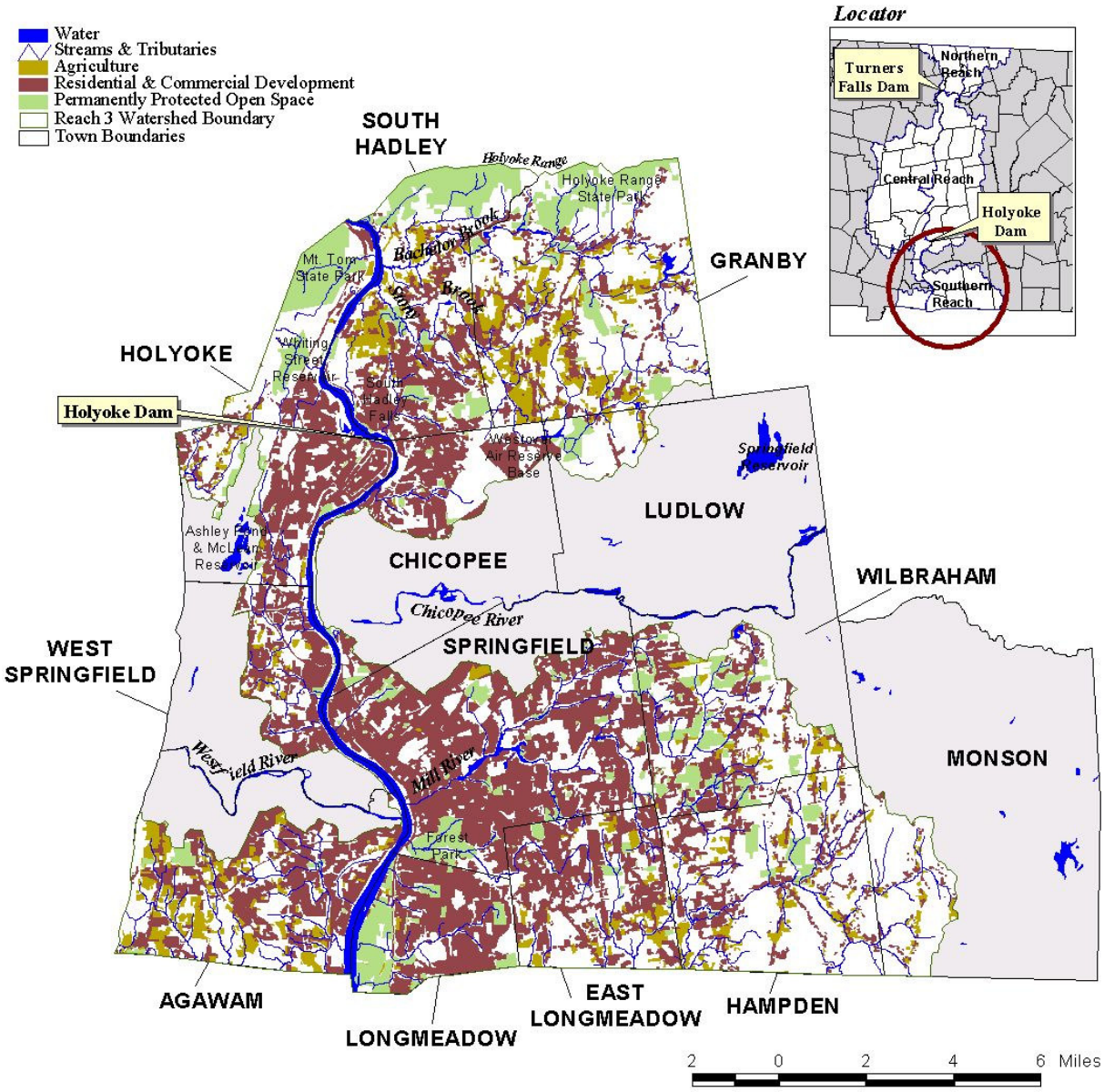
- **Support the protection of existing vegetated riparian corridors and the confluence points of the Connecticut River and its tributaries**. This would include coordinating with federal and state agencies and local land trusts involved in the protection of land.

- **Complete a demonstration project for the reduction of impervious surfaces within a riparian buffer**. Identify a willing property owner to work with and partner with other agencies to design a remedial plan.

- **Conduct outreach and education for riparian buffer property owners**. Efforts should focus on reducing the amount of suburban lawns present within the riparian zones along the Reach's rivers and streams as well as the reduction in the use of fertilizers and pesticides.

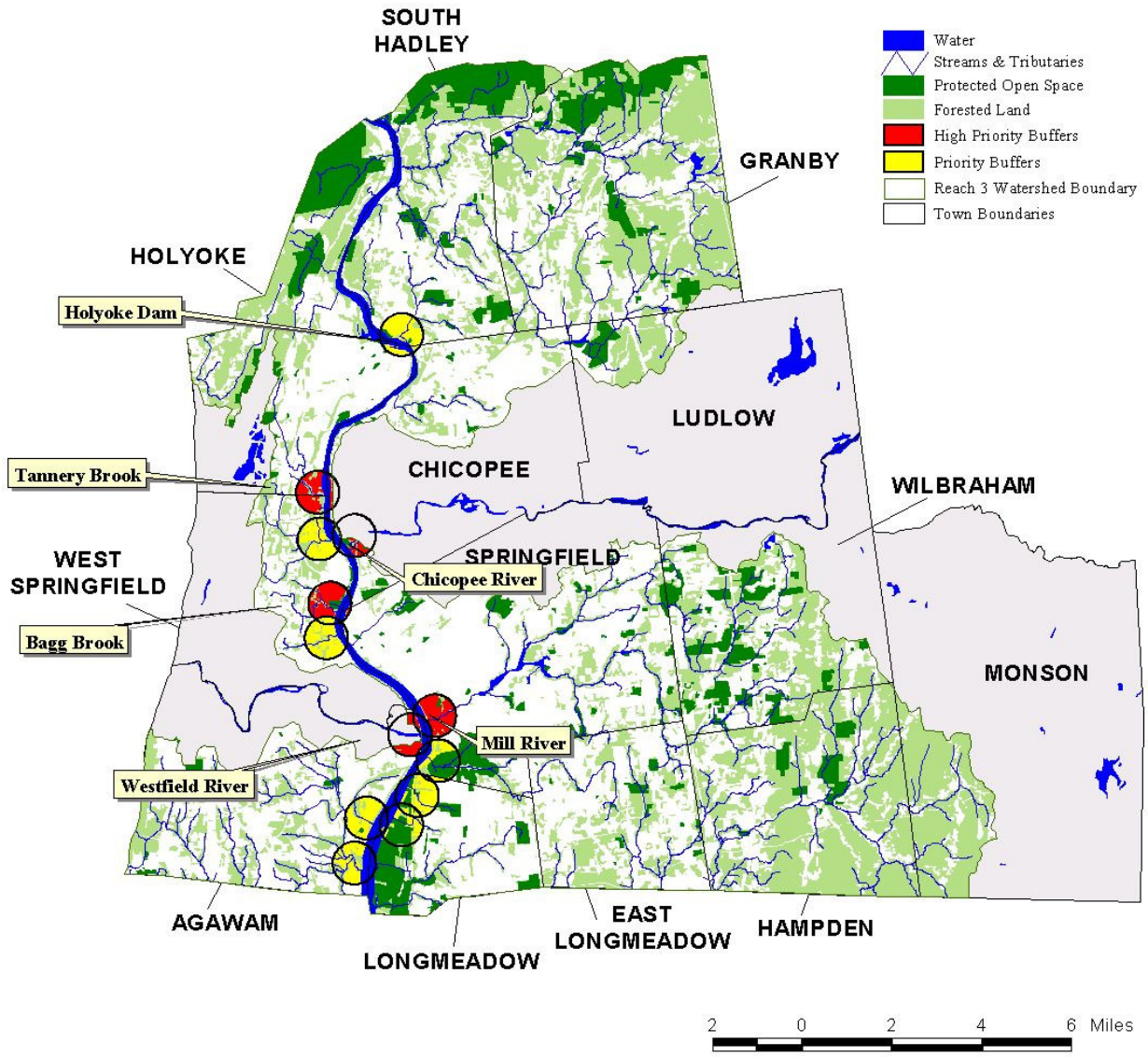
Map 3.1

Southern Reach, Connecticut River Watershed (MA)



Map 3.2

Priority Riparian Buffers at Confluence Points



Southern Reach
Connecticut River Watershed, Massachusetts
Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

WATER QUALITY AND NON-POINT SOURCE POLLUTION

Water Quality Assessment Findings:

The presence of Combined Sewer Overflows (CSOs) is the major water quality issue in the Southern Reach. These overflows make the waters unsafe for swimming and other recreational activities (Pioneer Valley Planning Commission, 2001). Stormwater runoff brings sediment, fertilizer, pesticides, automobile waste, higher thermal values and reduced dissolved oxygen levels to tributary streams as well as the Connecticut River Mainstem. The resulting introduction of pollutants and the increase in water temperature can result in adverse impacts on aquatic organism within the streams and rivers of the Southern Reach.

The contamination of fish with PCBs and other pollutants is a concern in the Southern Reach as it is throughout the Watershed. A significant number of residents and visitors fish in the Connecticut River and its tributaries throughout the Southern Reach including residents of diverse ethnic and socioeconomic backgrounds who consume the fish that they catch.

Nonpoint Source Pollution Findings:

The Southern Reach is by far the most heavily urbanized section of the Connecticut River watershed in Massachusetts. As a result, the Reach contains a high percentage of impervious areas. According to the Connecticut River Strategic Plan (2001) the total acreage of parking lots and buildings (over five acres in size) is 891 acres in Holyoke and 483 acres in Springfield.

To reduce nonpoint source pollution from stormwater runoff, the Connecticut River Strategic Plan proposes the removal of impervious surfaces within 50 feet of streams and the investigation of "functional replacements" (such as the use of permeable pavement) for impervious surfaces within 100 feet of streams, in developed areas (PVPC, 2001). In the urbanized areas, the removal or retrofitting of impervious areas and the implementation of Stormwater Best Management Practices (BMPs) could be beneficial in improving water quality. The interception and redirection of stormwater, that would otherwise enter storm drains and CSOs, would contribute to the reduction of peak flow during heavy storms. One example is to collect runoff from roofs for use in lawn irrigation.

The areas of the Southern Reach where a high percentage of impervious areas are located in close proximity to rivers and streams have been identified as illustrated on Map 3.3. These areas contain commercial, industrial and dense residential uses with greater than 25% impervious surfaces. Areas with high percentages of impervious surfaces are most likely to be affected by increase stormwater runoff into rivers and streams.

Significant nonpoint source pollution problems affect Watershops Pond in Springfield. A cooperative project involving the City of Springfield and the Massachusetts Department of Environmental Protection has resulted in the assessment of nonpoint source pollution and the development of remedial measures (City of Springfield, 2000). Other urban waterbodies in the Southern Reach may also benefit from this type of cooperative work. Another example is Black Stevens Pond in South Hadley. The Town of South Hadley has completed an assessment of the pond and the stream system that feeds it and has been pursuing funding to implement nonpoint source pollution reduction measures (Hazzard, 2002).

The City of Springfield has implemented a number of projects to address water quality and build public awareness of nonpoint source pollution issues within the City. A storm drain-stenciling program has been implemented in both English and Spanish. The City has started a program called the Springfield Surface

Water Action Monitoring Program (SSWAMP) in which citizens regularly monitor surface water bodies. Results of the sampling are posted on kiosks at the individual waterbodies. Finally, the Springfield Planning Department is in the process of establishing pond associations among the residents who live along the shorelines of ponds within the City (Galuzzo, 2002).

Water Quality and Nonpoint Source Pollution Objectives and Priority Actions:

The following objectives and priority actions were developed from the results of the assessments completed for water and nonpoint source pollution issues in the Southern Reach.

Objectives:

- Increase awareness of water quality issues within the Southern Reach of the Watershed.

- Assist Southern Reach communities in building their capacity to improve and protect water quality and reduce nonpoint source pollution.

Priority Actions:

- **Conduct outreach to communities to help them implement Stormwater Management Regulations.** Provide examples of stormwater management guidelines that can be used to reduce nonpoint source pollution.

- **Assist with the establishment of Stormwater Utilities in willing communities.** The establishment of stormwater utilities such as has been done in Chicopee may be helpful in generating revenue and a framework for improving the management of stormwater and the reduction of nonpoint source pollution. EOEA should assist willing communities in the establishment of stormwater utilities.

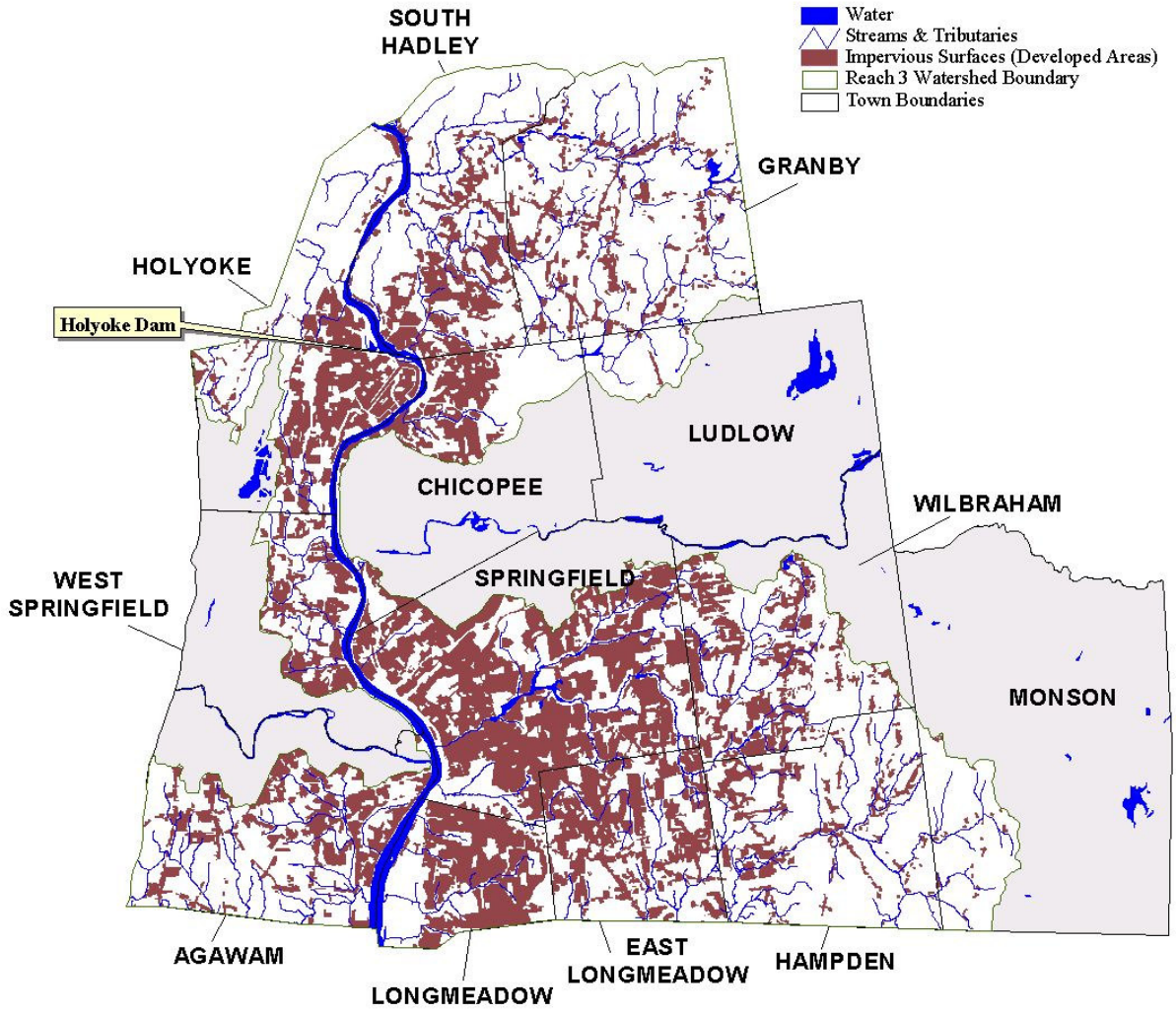
- **Complete a demonstration project for the reduction of nonpoint source pollution.** This could be coordinated with the completion of a riparian buffer impervious surface removal demonstration project.

- **Take steps to encourage the implementation of the CSO Abatement Plan throughout the Reach.** This will include acting as a liaison between local groups, communities and state and federal agencies.

- **Conduct education and outreach to citizens about the quality of fish in the Connecticut River and its tributaries.** This includes posting signs at popular fishing areas and distributing the results of the "Source to Sea" fish assessment to local community and ethnic groups. Assist existing programs in the City of Springfield and begin work in other communities.

Map 3.3

Impervious Surfaces Near Waterways



Southern Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

WATER QUANTITY

The protection and conservation of public drinking water supplies is another priority for the Southern Reach I. Map 3.4 shows where groundwater aquifers used as drinking water source are potentially threatened by runoff from nearby roads, highways and high intensity landuses (commercial/industrial), which were identified using an analysis of available GIS datalayers. To protect these aquifers it will be necessary to establish additional aquifer protection zones in the Stony Brook and Bachelor Brook subwatersheds, as shown on Map 3.4. To establish additional aquifer protection zones it will be necessary to work with local communities as well as the State's Department of Environmental Protection.

Water Quantity Assessment Findings:

The urban areas in the Southern Reach depend upon distant surface reservoirs for their water supply, while rural and suburban areas have relied on groundwater aquifers. Surfacewater sources are threatened by acid rain and atmospheric mercury deposition. Groundwater sources are vulnerable to infiltration of pollutants such as road salt, landfill leachate, bacteria, pesticides, and hydrocarbons (Pioneer Valley Planning Commission, 1987). The Massachusetts DEP is currently implementing the Source Water Assessment Program (SWAP) that will identify potential threats to existing public water supplies (Skiba, 2001). The results of the assessments will assist local communities in developing protection plans for their drinking water sources. Grants will be available for planning and implementation of source protection actions.

Much of the drinking water used within the Southern Reach of the watershed originates from outside the Connecticut River Mainstem Watershed. Reservoirs developed to supply the urban communities of the Southern Reach can deplete streamflow in streams downstream. By encouraging water conservation in the Southern Reach communities, opportunities for restoration natural flow regimes in adjacent watersheds may be realized.

The Water Resources Map (Map 3.4) shows groundwater sources of drinking water whose protection is at risk from increasingly reduced natural open space areas and impacts from development. Impervious surfaces divert rainwater that would normally seep into groundwater aquifers and subsequently into streams and rivers. Eventually, this diversion of runoff can reduce the amount of groundwater available for human use. Land uses present in urban areas can also threaten contamination of groundwater aquifers.

Water Quantity Objectives and Priority Actions:

The objectives and priority actions for the Southern Reach focus on assisting local communities with the protection of existing drinking water supplies.

Objective:

- Assist local communities with the protection of their drinking water supplies.

Priority Actions:

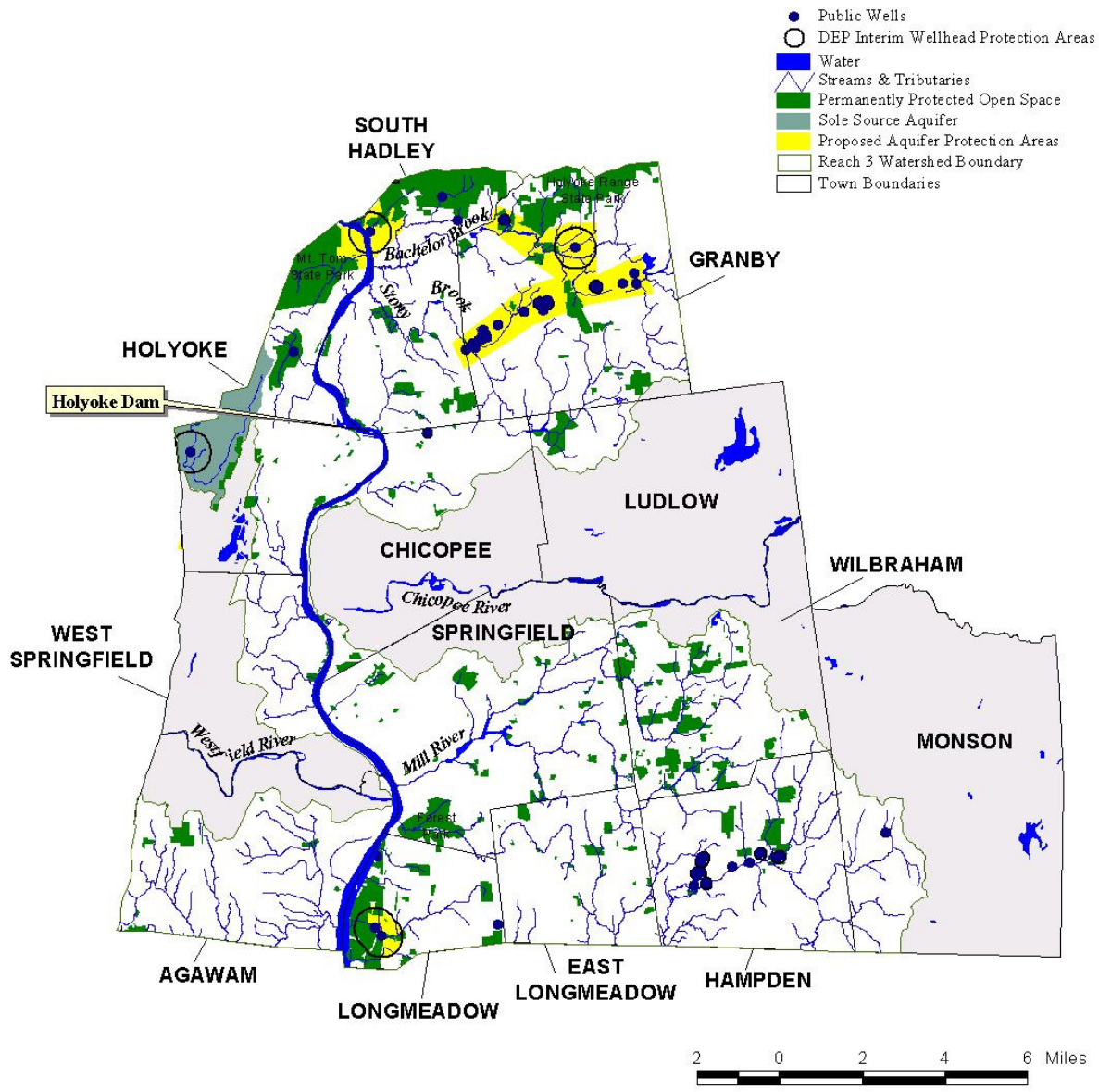
- **Assist communities with the implementation of Source Water Assessment Program information.** This will include outreach to communities to help them develop strategies for address potential contamination issues when SWAP reports are made available.

- **Provide communities with model Aquifer Protection Regulations.** This will provide communities with tools to help ensure that their current and future drinking water resources are protected.

- **Assist communities with the implementation of water conservation programs.** Provide guidance and literature to help communities implement water conservation programs. Focus on reducing water use for outside watering and lawn irrigation.

Map 3.4

Water Resources



Southern Reach

Connecticut River Watershed, Massachusetts

Data Source: MassGIS

Prepared by: UMass Department of Landscape Architecture & Regional Planning

WILDLIFE HABITAT AND FISH PASSAGE

Assessment Findings:

Despite a large amount of urbanization, wildlife habitat does exist within the Southern Reach. The review of reports including the Connecticut River Strategic Plan and the Silvio O. Conte National Fish & Wildlife Refuge Action Plan indicate there is remaining valuable wildlife habitat present in the Southern Reach. Information provided by the State's Natural Heritage and Endangered Species Program indicates the presence of numerous animal species within the watershed, including a number of endangered species. Threats to the remaining habitat in the Southern Reach include extensive habitat fragmentation and loss of connectivity (see Map 3.5). Residual habitats, both aquatic and terrestrial, are often degraded. Non-native plant species (e.g., Water Chestnut, Japanese Knotweed, Phragmites, Fanwort and Purple Loosestrife) cover areas formerly occupied by native species. Within the Southern Reach, a significant amount of habitat for both fish and terrestrial wildlife exists at the confluence points. Impacts from urbanization, especially stormwater runoff, have contributed to the degradation of these areas. Examples of important confluence points include Tannery Brook, Bagg Brook, Chicopee River and Westfield River.

Fish passage improvements along the mainstem of the Connecticut River have been installed at the Holyoke Dam. The breaching of the Enfield Dam in Northern Connecticut has also improved the ability of anadromous fish to migrate upstream into Massachusetts. Other barriers to fish passage in the Southern Reach are located on the tributary streams and rivers and consist of small dams, road crossings and channelization. None of the tributaries within the Southern Reach have been identified as current priorities for improving passage for anadromous fish species (U.S. Fish & Wildlife Service, 1995; Connecticut River Atlantic Salmon Commission, 1998). Fish passage improvements in the tributaries should focus on improving river continuity for resident and stocked fish populations.

Wildlife Habitat and Fish Passage Objectives and Priority Actions:

Within the five-year action plan, attention should be focused on the improvement of the priority confluence points identified on Map 3.2. Habitat protection efforts should be concentrated on the unprotected certified habitat areas identified on Map 3.5. The following list summarizes the wildlife habitat and fish passage objectives and priority actions for the Southern Reach. A five-year action plan for improving fish habitat should concentrate on the restoration of tributary confluence points and the improvement of water quality to support fish populations.

Objectives:

- Promote the protection of remaining wildlife habitat throughout the Southern Reach of the Watershed

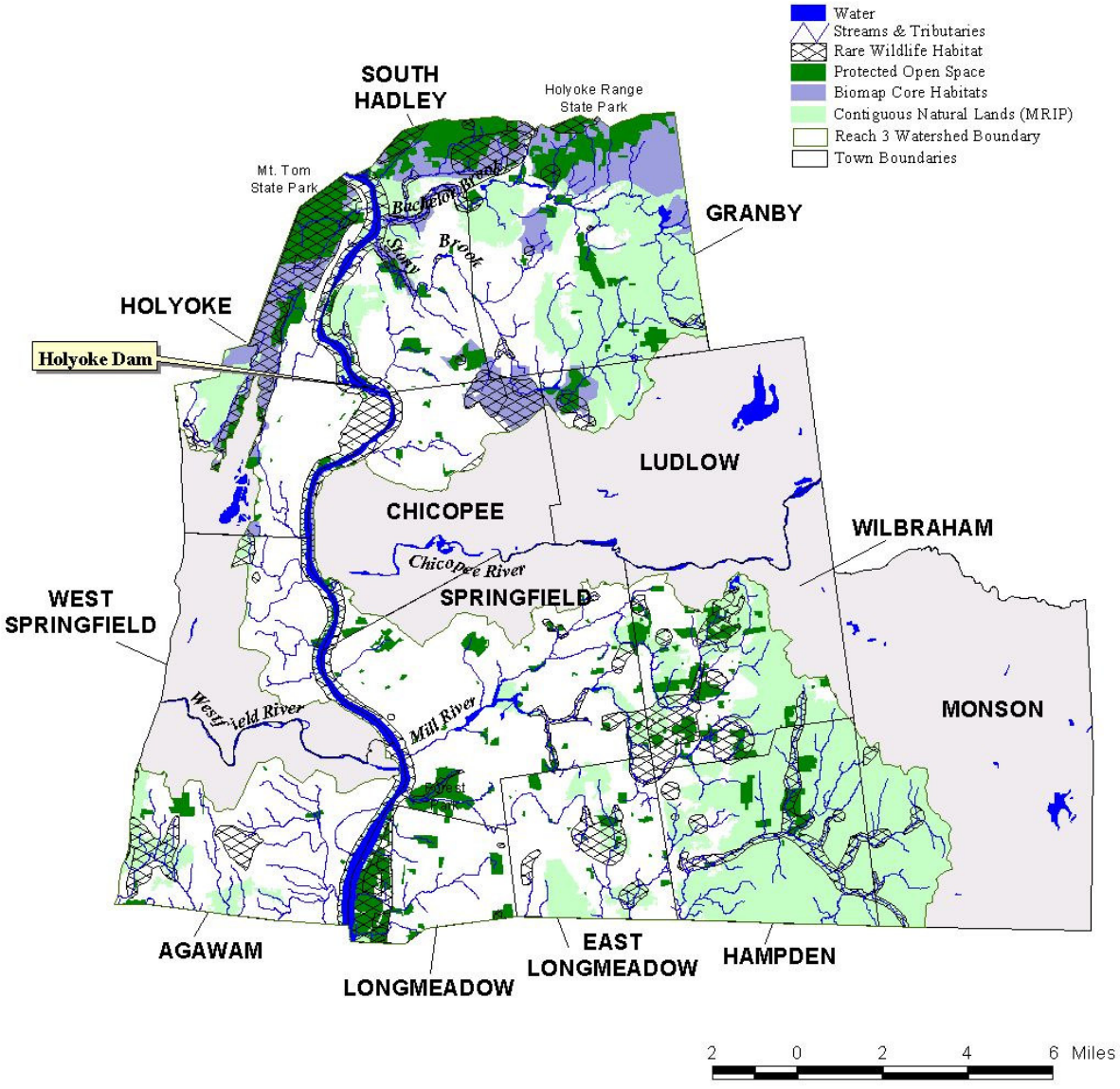
- Improve fish passage and river connectivity along the tributaries to the Connecticut River in the Southern Reach.

Priority Actions:

- **Encourage protection of certified endangered species habitat along the Connecticut River.** This will involve coordinating with federal and state agencies as well as local communities and land trusts to provide protection of wildlife habitat. The role of EOEA will be primarily a supportive one.

Map 3.5

Wildlife Habitat Priority Areas



Southern Reach
Connecticut River Watershed, Massachusetts

Data Source: MassGIS
Prepared by: UMass Department of Landscape Architecture & Regional Planning

- **Work with the Massachusetts Highway Department to develop a protocol to improve fish passage at road crossings at the time of reconstruction.** The work is currently part of the Stream Continuity Project being coordinated by UMASS Extension. This will be an incremental process and may result in procedures that could be duplicated in other Reaches and Watersheds.

- **Identify appropriate locations for fish passage improvements on the smaller tributaries within the Southern Reach.** Examples include the Mill River-Springfield and the small tributaries feeding the ponds in Forest Park in Springfield.

PUBLIC ACCESS AND RECREATION

Assessment:

A number of sources provided information on the current status of public access and recreation, current plans for expansion and needs for additional public access in the Southern Reach including the Connecticut River Strategic Plan and the Connecticut River 2020 Strategy. Interviews were conducted with state and local officials including Terry Blunt, (Connecticut River Greenway State Park), Jack Hunter, (Holyoke City Planner), Henry Kozloski (Agawam Conservation Commission), John O'Leary (former Connecticut River Watershed Team Leader), Rick Werbiskis (West Springfield Town Planner).

Land acquisition within the Southern Reach is not as high a priority as maintenance and improvement of vegetated riverside buffers and public access areas (Blunt, 2001). Recreational infrastructure such as trails and bikeways provide an opportunity for increasing awareness of watershed issues such as water quality and riparian buffer improvements. By providing access sites, people will gain greater contact with the River. Combined with educational programs additional contact with the River can increase citizens' awareness of ecological issues and build support for environmental projects.

Existing public access sites and existing and proposed greenways and bike paths within the Southern Reach are identified on Map 3.6. River recreation within the Southern Reach should reflect local river configuration and hydrology. From the Holyoke Dam to the Connecticut State Line, the Connecticut River is both shallow and calm. Boating use in this section of the river should include canoeing, kayaking and sailing (Blunt, 2001). Improvements to existing public access points as well as the development of additional access sites is needed throughout the Southern Reach (Pioneer Valley Planning Commission, 2001; Terry Blunt, 2001).

Greenway and Public Access Plans within the Southern Reach:

There has been a good deal of progress on the design of a bike path along the river from Agawam to Holyoke. Paths are planned on alternating sides of the river from Agawam to Holyoke. The following is a brief overview of the development status of other public access plans in the Southern Reach.

Agawam - An Agawam bikeway loop is being planned for along Main Street and a local road. The Massachusetts Highway Department is being lobbied for bike and pedestrian access during future reconstruction of the South End Bridge (Kozloski, 2001). A public access point for the Westfield River confluence area, known as Pynchon's Point, is in the design phase.

West Springfield - Consultants are currently preparing design proposals for a public access area on town-owned land next to the Riverdale Shops. The large parking area at the West Springfield Town Launch,

also called Moody's Launch, presents an interesting opportunity for stormwater management and river access. The confluence of Bagg Brook is the southernmost point of the bike trail under design for the town of West Springfield. The Pioneer Valley Planning Commission is currently considering design alternatives for a public access area at this site (Curtis, 2001).

Springfield - The Basketball Hall of Fame is an area of economic redevelopment and presents several opportunities for access areas, including the current rebuilding of the existing riverfront trail and parking areas. There is a potential for access and trails in the Clinton Street area. Another potential access point is located at the Mill River confluence area. Daylighting the Mill River in the area, while possible, would require a significant effort over a long-term period.

Chicopee - A riverwalk stretching to the north and south of the Chicopee River is at the 25% design stage. Negotiations are stalled with the railroad that owns a piece of land to the south, which would provide a link with Springfield. There are unresolved issues regarding connections across the Chicopee River. A spur trail is being planned along the Chicopee River. Several opportunities exist for additional public access sites including a former power plant that is being studied by several groups. There are environmental issues on the site that will need to be addressed before this site could be developed (Blunt, 2001).

Holyoke - A canal walk north of the Pulaski Bridge has the potential to be developed into a circular loop. The city has recently acquired a parcel of land at Log Pond Cove as part of their purchase of the Hydroelectric Project at Holyoke Dam (Hunter, 2001). The city does not plan to develop public access to this site because of the difficulty in crossing an existing railroad and the presence of important wildlife habitat. However, other public access sites under consideration include a boat access at Smith's Ferry south of Holyoke Dam and a riverfront park near the fish elevator at the Holyoke Dam. The City is also currently considering purchasing the Jones Ferry Marina for development as a public access site.

Lateral Greenways:

Although the development of greenways and access points along the Connecticut River is progressing, there is a need to develop lateral greenways along the Connecticut Rivers major tributaries. These lateral greenways could be utilized to provide access from urban centers along the tributaries to greenways and public access points along the tributaries to greenways and public access points along the mainstem of Connecticut River.

Renovation and Maintenance of Existing Access Points:

Several of the existing facilities listed above have features that could be enhanced through maintenance and improvements. Improving the existing access points would help increase the public support for increasing public access within the Southern Reach. An example of a public access site that could use some improvements is Moody's Launch in West Springfield where parking improvements are needed. In addition to improving existing public access sites, the connectivity of existing sites should be improved. Increasing the amount of directional signs and map kiosks along the river would help direct people to public access sites. Improved connections between existing public access sites should also be explored.

Additional issues along the mainstem of the Connecticut River in the Southern Reach include impacts from the use of motorboats and unauthorized camping and picnicking along the shoreline. These activities can have adverse impacts on wildlife and wildlife habitat.

Public Access and Recreation Objectives and Priority Actions:

Objectives:

- Improve the quality of existing access points to the river through improvements and maintenance of these facilities, and by encouraging private enterprise that promotes use of the river.

- Create a series of lateral trails for that would connect populated areas to the main trail along the river.

- Promote existing river access points and feeder trails through signage and other methods and improve the visibility of these access points from nearby roads, parks, and other public areas.

- Increase the number of access points along the Connecticut River and its tributaries in a manner that balances recreation and resource protection.

Priority Actions:

- **Work with communities in the Southern Reach to improve existing public access areas.** This will include working with communities and local non-profit recreational groups to identify and assess the existing public access points and develop a plan for improvements.

- **Create a system of lateral greenways along the major tributaries of the Connecticut River.** The purpose of these greenways will be to connect the town and city centers to the planned bike and greenways along the Connecticut River. Connections to significant public parks such as Forest Park in Springfield should also be included.

- **Assist with the development of a public access area at the confluence of Bagg Brook and the Connecticut River.** Coordinate with the Pioneer Valley Planning Commission, which is currently involved in considering design alternatives for this site.

- **Provide education to recreational users about minimizing impacts on natural resources.** Focus on reducing impacts from unauthorized use of land along the river and the prevention of the spread of invasive species throughout the Reach.

- **Develop formal picnicking areas along the river for use by the boating public.** If possible these areas should be developed so that access is by water only and they are located in areas that would have the least amount of adverse impacts on wildlife.

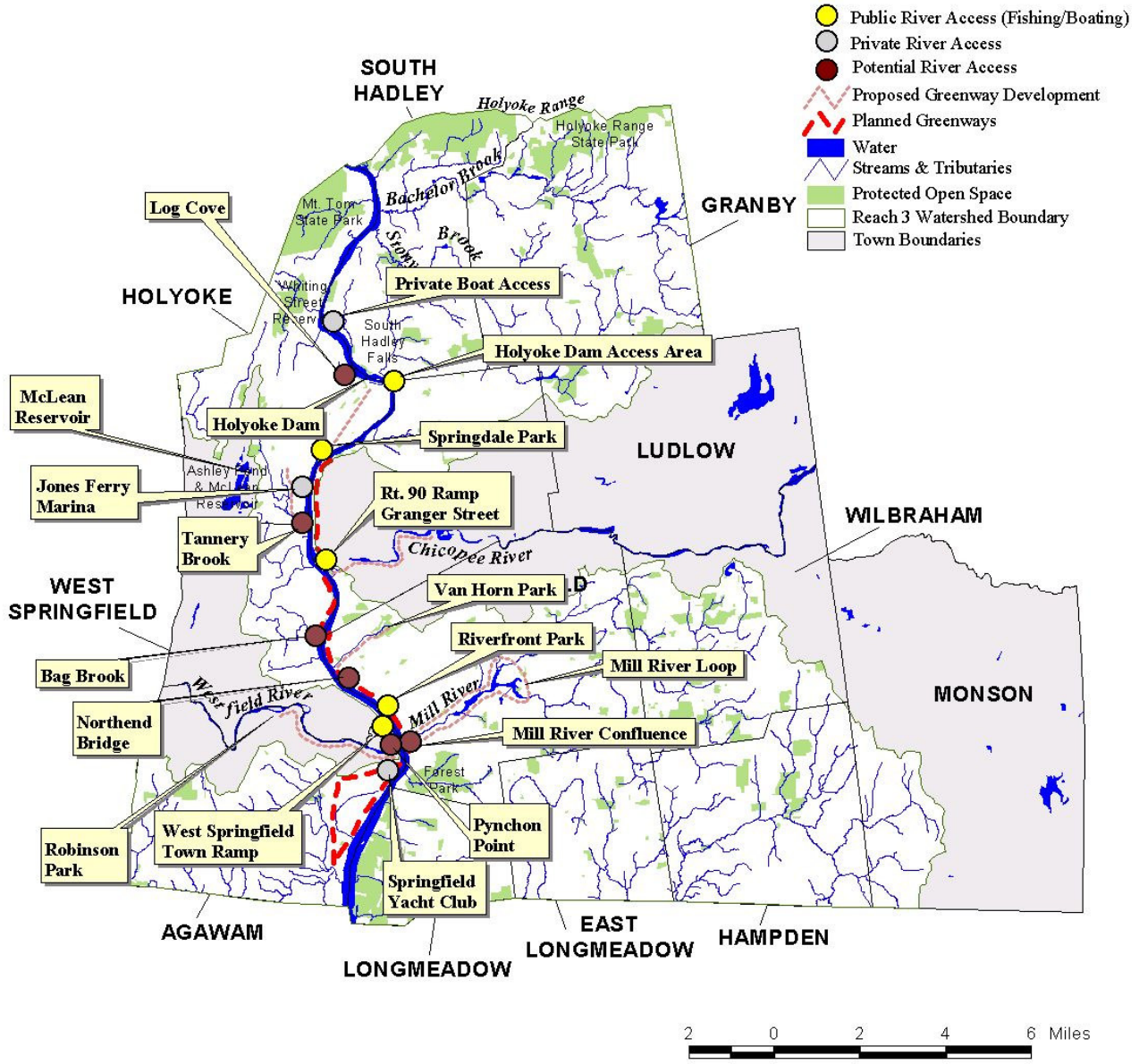
- **Develop a Recreational Management Plan for the stretch of the Connecticut River below the Holyoke Dam.** The plan should identify current and future recreational needs along the River and a vision for guiding future proposals for additional recreational uses.

- **Provide additional access for fishermen.** Focus on the flood control levees in the Holyoke area and other site identified that are popular with fishermen.

- **Develop a public relations campaign to increase knowledge and use of public access sites.** The campaign should be focused on achieving a balanced use of sites and discouraging overuse. The campaign will consist of additional signs, publicity and possibly promoting river festivals to draw people to the Connecticut River.

Map 3.6

Proposed Connections & Public River Access



Southern Reach

Connecticut River Watershed, Massachusetts

Data Source: MassGIS

Prepared by: UMass Department of Landscape Architecture & Regional Planning

CHAPTER 4: ACTION MATRIX

THE NORTHERN REACH OF THE WATERSHED

The following five-year timeline represents a proposed schedule for the completion of the watershed actions identified for the Northern Reach of the Connecticut River Watershed. The proposed schedule is estimated and the completion of specific actions will depend upon the limited resources available to EOEA. It will be necessary to form partnerships with other stakeholder groups as well as federal and state agencies to implement many of these actions. Appendix A contains a listing of possible partners and funding sources to complete these actions.

ACTIONS	Year 1	Year 2	Year 3	Year 4	Year 5
Riparian Corridors					
Landowner Educational Program for Riparian Corridors	Identify organizations or consultants that could assist in development of program	Develop educational materials	Conduct educational workshops for landowners	Continue distribution of educational materials	Continue distribution of educational materials
Riparian Corridor Restoration Demonstration Projects	Identify potential willing landowners	Design remedial measures	Secure funding and begin remedial measures	Complete remedial measures including follow-up	
Water Quality and Nonpoint Source Pollution					
Reach-wide Water Quality-Monitoring Program.	Prioritize subwatersheds for monitoring based on GIS landuse analysis	Identify partners for completing monitoring program	Conduct monitoring program		
Establish additional Stream Teams	Identify appropriate tributaries for stream teams as well as potential team members	Establish stream teams	(see Stream Team actions under Wildlife Habitat and Fish Passage)		
Growth Management Measures	Develop strategies for informing communities about growth management options.	Work w/ FRCOG to create community visions and educate local officials about growth management and open space protection.	Begin revising town master plans and examining zoning regulations.	Assist communities with the adoption of Growth Management Strategies.	Continue to assist communities with the adoption of Growth Mgt. Strategies.
Stormwater Management Assistance	Provide outreach to communities to assist with implementation of stormwater policy	Continue outreach efforts			
Stormwater Compliance Outreach Dirt Road Mgt.	Distribute DEP's Dirt Road Management BMP Manual		Assess use of manual by communities		

ACTIONS	Year 1	Year 2	Year 3	Year 4	Year 5
Water Quantity					
Assist with implementation of SWAP recommendations	Develop protocol for assisting communities with implementation of recommendations	Provide assistance to communities as the SWAP Reports are completed	Continue to provide community assistance	Continue to provide community assistance	Continue to provide community assistance
Assess high priority tributaries for streamflow modifications	Identify likely partners for the completion of assessments including volunteer groups	Develop protocol for assessing streamflow modifications	Conduct assessments of priority tributaries	Continue assessments	Continue assessments
Wildlife Habitat and Fish Passage					
Use Stream Teams to identify other barriers to fish passage	Develop protocol for conducting identification of barriers to fish passage	Train volunteer groups to conduct assessments	Conduct assessments	Conduct assessments	Conduct assessments
Public Access and Recreation					
Inventory of boat access points	Identify appropriate entity to conduct the inventory	Conduct inventory	Determine adequacy of the access points	Publish results of inventory	
Implement a boater education program	Identify appropriate partners and begin to develop educational material	Continue developing educational materials	Distribute materials and place informational signs	Continue information distribution	Continue information distribution
Develop public access at Fall River Dam Site	Identify cooperators and interested parties	Secure funding for design	Complete design of public access	Secure funding for construction	Complete construction

THE CENTRAL REACH OF THE WATERSHED

The following five-year timeline represents a proposed schedule for the completion of the watershed actions identified for the Central Reach of the Connecticut River Watershed. The proposed schedule is estimated and completion of specific actions will depend upon the limited resources available to EOEA. It will be necessary to develop partnerships with other stakeholder groups as well as federal and state agencies to implement many of these actions. Appendix A contains a listing of possible partners and funding sources to complete many of these actions.

ACTIONS	Year 1	Year 2	Year 3	Year 4	Year 5
Riparian Corridors					
Riparian buffer enhancement during redevelopment	Develop and implement outreach to assist communities with implementing Rivers Protection Act	Continue outreach efforts	Continue outreach efforts	Continue outreach efforts	Evaluate success of outreach efforts
Riparian Corridor Restoration Projects	Identify potential willing landowners	Design remedial measures	Secure funding and begin remedial measures	Complete remedial measures	
Landowner Educational Program for Riparian Corridors	Identify organizations or consultants that could assist in development of program	Develop educational materials	Conduct educational workshops for landowners	Continue distribution of educational materials	Continue distribution of educational materials
Complete Erosion Restoration Demonstration Projects	Identify appropriate site for restoration	Design remedial measures	Secure funding and begin remedial measures	Complete remedial measures	Complete remedial measures
Identify erosion sites along major tributaries	Develop partnerships with local communities and volunteer groups	Inventory known erosion sites through interviews with local citizens	Conduct field assessments to identify additional erosion sites	Continue field assessments	Complete final report identifying tributary erosion sites
Support efforts to control invasive plant species	Assist willing groups with implementation of control projects	Continue efforts	Continue efforts	Continue efforts	Continue efforts
Water Quality and Nonpoint Source Pollution					
Reclassify eligible headwater streams	Coordinate with DFWELE and DEP and determine reclassification procedure	Identify streams for reclassification	Pursue reclassification	Conduct outreach to educate public about changes to classifications	
Develop Regional Open Space Protection Strategy	Convene group of stakeholders to develop prioritization strategy	Identify areas to protect that will preserve water quality	Develop Memorandum of Understanding (MOU)	Gain agreement with MOU	Implement MOU

ACTIONS	Year 1	Year 2	Year 3	Year 4	Year 5
Water Quality and Nonpoint Source Pollution (continued)					
Establish additional Stream Teams within the Central Reach	Identify candidate subwatersheds	Identify likely participants, coordinate with DFWELE Riverways Program	Establish Stream Teams	Establish Stream Teams	Establish Stream Teams
Reach-wide Water Quality-Monitoring Program.	Prioritize subwatersheds for monitoring based on GIS landuse analysis	Identify partners for completing monitoring program	Conduct monitoring program		
Stormwater Compliance Outreach	Develop educational materials	Conduct educational workshops for landowners	Continue distribution of educational materials	Continue distribution of educational materials	
Nonpoint Source Pollution Reduction Demonstration Projects	Identify potential willing landowners	Design remedial measures	Secure funding and begin remedial measures	Complete remedial measures including follow-up	
Water Quantity					
Assess high priority tributaries for streamflow modifications	Identify likely partners for the completion of assessments including volunteer groups	Develop protocol for assessing streamflow modifications	Conduct assessments of priority tributaries	Continue assessments	Continue assessments
Determine impacts of future development on water supplies	Draft an RFP for the project and secure funding for the project	Advertise RFP and award contract	Administer contract	Administer contract	Final completion of project
Assist with implementation of SWAP recommendations	Develop protocol for assisting communities with implementation of recommendations	Provide assistance to communities as the SWAP Reports are completed	Continue to provide community assistance	Continue to provide community assistance	Continue to provide community assistance
Wildlife Habitat and Fish Passage					
Initiate public education about rare and endangered species	Consult with partners to develop an education program	Secure funding for implementing an education program	Implement education program	Implement education program	Implement education program
Support efforts to improve fish passage	Identify stakeholder groups willing to participate in fish passage improvements	Assist with development and implementation of projects	Continue efforts	Continue efforts	Continue efforts

ACTIONS	Year 1	Year 2	Year 3	Year 4	Year 5
Wildlife Habitat and Fish Passage (continued)					
Implement recommendations of the Stream Continuity Project			Identify feasible projects and implement	Continue efforts	Continue efforts
Public Access and Recreation					
Informal campsite in the Connecticut River Water Trail	Coordinate stakeholder groups and form partnerships, inventory and prioritize potential sites, and identify potential funding	Identify target site and pursue acquisition and/or easement with landowner	Secure funding and come to consensus on size, design, and facilities	RFP for design and/or construction	Construction completed
Limited access site along the Connecticut River Water Trail	Coordinate stakeholders, analyze all potential sites Work with local land trusts that may explore funding options and work with willing landowners	Finalize site location Seek public access easement and apply for funding	Finalize layout of car-top access and secure funding	Send out RFP for construction	Construction complete
Implement a recreational user education program	Identify organizations or consultants that could assist in development of program	Develop educational materials	Conduct educational workshops for landowners	Continue distribution of educational materials	Continue distribution of educational materials

THE SOUTHERN REACH OF THE WATERSHED

The following five-year timeline represents a proposed schedule for the completion of the watershed actions identified for the Southern Reach of the Connecticut River Watershed. The proposed schedule is estimated and completion of specific actions will depend upon the limited resources available to EOEA. It will be necessary to form partnerships with other stakeholder groups as well as federal and state agencies to implement many of these actions. Appendix A contains a listing of possible partners and funding sources to complete many of these actions.

ACTIONS	Year 1	Year 2	Year 3	Year 4	Year 5
Riparian Corridors					
Control invasive plant species throughout the Reach	Work with the Conte National Fish & Wildlife Refuge to identify areas containing invasive plants	Identify control projects and potential partners for completion and begin implementation	Continue efforts	Continue efforts	Continue efforts
Support protection of important confluence points	Assist efforts of federal, state and local agencies as well as non-profit groups				
Complete an Impervious Surface Reduction Demonstration Project	Identify potential willing landowners	Design remedial measures	Secure funding and begin remedial measures	Complete remedial measures including follow-up	
Conduct Outreach and Education for Riparian Buffer Property Owners	Identify organizations or consultants that could assist in development of program	Develop educational materials	Conduct educational workshops for landowners	Continue distribution of educational materials	Continue distribution of educational materials
Water Quality and Nonpoint Source Pollution					
Stormwater Compliance Outreach	Develop educational materials including model stormwater regulations	Conduct educational workshops for communities	Continue distribution of educational materials	Continue distribution of educational materials	
Establish Stormwater Utilities	Create stake-holder committee to investigate the establishment of a stormwater utility in Reach	Conduct feasibility study of impacts of stormwater utility on local residents and businesses.	Finalize stormwater fee ordinance and begin quarterly fee collection		
Nonpoint Source Pollution Reduction Demonstration Projects	Identify potential willing landowners	Design remedial measures	Secure funding and begin remedial measures	Complete remedial measures including follow-up	
Conduct Fish Contamination Education and Outreach	Identify organizations that could assist in development of program	Develop educational materials	Begin publicity campaign	Continue distribution of educational materials	Continue distribution of educational materials

ACTIONS	Year 1	Year 2	Year 3	Year 4	Year 5
Water Quantity					
Assist with implementation of SWAP recommendations	Identify communities for which SWAP complete, provide assistance	Continue assistance efforts	Continue assistance efforts	Continue assistance efforts	Continue assistance efforts
Provide communities with model Aquifer Protection Regulations	Identify examples of appropriate model regulations	Distribute model regulations to local communities	Conduct outreach to assist communities with adopting regulations	Continue outreach	Continue outreach
Assist communities with implementation of water conservation programs	Identify communities willing to participate. Distribute outreach materials to communities.	Continue outreach efforts	Continue outreach efforts	Continue outreach efforts	Continue outreach efforts
Wildlife Habitat and Fish Passage					
Develop a protocol to improve fish passage at road crossings	Establish partnership with Massachusetts Highway Department	Develop protocol for including fish passage improvements in road redesigns			
Identify potential locations for fish passage improvements on tributaries	Develop protocol for conducting assessment of barriers to fish passage	Identify partners to conduct assessments	Conduct assessments	Conduct assessments	Conduct assessments
Public Access and Recreation					
Improve existing public access areas	Identify possible site by discussing with local communities and state agencies	Prioritize public access sites for improvement	Assist local communities and state agencies secure funding and come to consensus on size, design, and facilities	Assist with RFP for design and/or construction	Construction completed
Create a system of lateral greenways	Coordinate stakeholders, analyze all potential routes	Seek public access easement and apply for funding	Finalize routes and secure funding	Send out RFP for construction	Begin construction
Assist with development of public access area at confluence of Bagg Brook and CT River	Assist with efforts of PVPC and local municipalities	Continue assistance	Continue assistance	Continue assistance	Continue assistance

ACTIONS	Year 1	Year 2	Year 3	Year 4	Year 5
Public Access and Recreation (cont.)					
Implement a recreational user education program	Identify organizations or consultants that could assist in development of program	Develop educational materials	Conduct educational workshops for landowners	Continue distribution of educational materials	Continue distribution of educational materials
Develop formal picnicking areas along Connecticut River	Identify interested stakeholder groups and begin site selection	Complete selection of site(s) and secure funding	Design picnic site(s)	Complete construction	Complete construction
Develop Recreational Management Plan for the Connecticut River in the Southern Reach	Identify stakeholder groups willing to be involved in the development of the plan and establish framework for plan development	Begin development of plan	Continue plan development	Continue plan development	Finalize plan
Provide additional access for fishermen	Identify possible site by discussing with local communities and state agencies	Prioritize locations for additional public access sites	Secure funding and come to consensus on size, design, and facilities	RFP for design and/or construction	Construction completed

CHAPTER 5: COMPARISON OF THE CONNECTICUT RIVER WATERSHED FIVE-YEAR ACTION PLAN AND THE CONNECTICUT RIVER STRATEGIC PLAN

The Connecticut River Watershed Five-year Action Plan builds on the foundation provided by the Connecticut River Strategic Plan in two ways. First, the Action Plan provides additional geographic specific assessment information regarding non-point source pollution, riparian buffer protection, wildlife habitat, water withdrawal issues, and recreational access issues. The Action Plan provides maps and illustrations that identify locations where specific watershed issues are of concern. The Action Plan developed as part of the Plan provides a specific framework for achieving some of the specific strategies identified in the Connecticut River Strategic Plan.

The following chart describes how the Connecticut River Watershed Five-year Action Plan addresses the watershed goals and strategies identified in the Connecticut River Strategic Plan. The strategies that are included in the Strategic Plan are listed with an explanation of the proposed actions for each Reach to implement the strategies. Where strategies were not addressed in the studio report for a specific Reach, reasons are given.

	Connecticut River Action Plan Recommendations		
CRSP Strategy	**The Northern Reach**	**The Central Reach**	**The Southern Reach**
Water Quality			
1. Adopt CSO control program	Only one CSO present in the Northern Reach, already being addressed	Not an issue in the Central Reach	Proposes that the Watershed Team take an active role in moving abatement plan forward.
2. Develop consistent water quality monitoring program	Proposes development of Reach-wide Water Quality Assessment	Proposes development of Reach-wide Water Quality Assessment	Proposes development of Reach-wide Water Quality Assessment.
3. Reduce urban, suburban runoff and rural non-point source pollution	GIS assessment identifies potential agricultural run-off areas and offering specific remediation and restoration actions.	Provides a framework for identifying and reducing non-point source pollution within focus areas identified in the assessment phase.	Identifies areas of concentrated impervious areas. Proposes demonstration project
4. Reduce soil erosion and sedimentation throughout the watershed	Identifies specific locations and tributaries where there are significant erosion issues and offers steps for future restoration.	Includes a schedule for remediation of erosion site demonstration project.	Priority areas for soil erosion improvements are identified as the confluence points of the CT River and its tributaries.
5. Reduce toxins in fish tissue	Due to the complexity of addressing this issue, it is not included in the five-year action plan.	Due to the complexity of addressing this issue, it is not included in the five-year action plan.	Due to the complexity of addressing this issue, it is not included in the five-year action plan.
6. Promote water conservation and efficient water supply delivery systems	Not considered a priority due to relatively low population and water use in Reach.	Focuses on identifying areas of flow modification issues resulting from water withdrawals.	Includes assistance with the implementation of water conservation programs at the municipal level.

7. Protect watershed and aquifer recharge lands	Growth management strategies will help prevent impacts to aquifers.	Provides an identification of these lands as well as a framework for protecting them. Proposes additional protection for first order streams.	Proposes additional aquifer protection areas in Granby, South Hadley, Holyoke and Longmeadow.
Stream Preservation			
8. Support the establishment of Stream Teams	Support existing Stream Teams in Bennett Brook and Sawmill River and establish additional teams.	Proposes additional Stream Teams including one for the Fort River	Support Mill River Partnership in Springfield.
9. Ensure adequate fish passage in the mainstem and subwatershed branches of the river	Identifies priority dam removal sites.	Identifies dams within the Reach.	Identifies tributary confluence areas as priority areas for fish passage and habitat improvements.
10. Prevent the introduction or spread of non-native invasive species	Proposes boater education through posting signs about invasive species prevention.	Proposes education of boaters through posting signs about invasive species prevention.	Proposes education of boaters through posting signs about invasive species prevention
11. Reduce the impact of water withdrawals downstream of public water supplies	One drinking water reservoir exists in Northfield. Proposes assessment of streamflow alteration in tributaries.	Provides a framework for further investigation into flow modification within the focus areas identified in the assessment phase.	Proposes increased water conservation measures that may provide opportunities to reduce impacts of water withdrawals from reservoirs in adjacent watersheds.
12. Restore vegetated riparian buffers	Contains a framework for restoring riparian buffers	Contains a framework for restoring priority buffers.	Identifies five tributary confluence points with the CT River as high priorities for buffer restoration.
13. Restore river connectivity	Land protection efforts and riparian buffer restoration will help restore river connectivity.	Land protection efforts and riparian buffer restoration will help restore river connectivity	The connectivity is considered a priority at the confluence points.
Land Use			
14. Promote "Smart Growth" in the watershed	Proposes implementation of Growth Management Strategies	Land protection strategy will help achieve "Smart Growth".	Due the high amount of urbanization, this was not considered a priority.
15. Preserve the rural character of the watershed by planning development based on natural resources	Proposes Growth Management strategies.	Proposes Regional Open Space Protection Strategy	Rural character preservation is not a priority in the Southern Reach.
16. Improve stormwater management in watershed	Riparian buffer demonstration projects proposed to address agricultural runoff.	Provides a framework for conducting public outreach and demonstration projects.	Proposes outreach to municipalities for implementing stormwater guidelines and regulations.
17. Identify and protect	Contains a framework	Land protection plan	Identifies important tributary

valuable open space in the watershed	for open space protection that guides land protection in the northern reach.	identifies priority areas that need protection.	confluence points for the protection of wildlife habitat.
18. Promote and facilitate Brownfields redevelopment	Not considered an issue due to limited industrial development in Reach.	Not considered an issue due to limited industrial development in Reach	Encourage reestablishment of riparian buffers during redevelopment of sites
19. Identify a location and process for developing an eco-industrial park	Not identified as an issue in Reach.	Not identified as an issue in Reach.	Eco-industrial park is not a priority in this plan.
Public Access			
20. Continue and support a network of greenway corridors	Not considered a priority within the five-year scope of this plan.	Not considered a priority within the five-year scope of this plan.	Proposes greenways to connect tributaries and mainstem
21. Use the river as a tourism destination and an agricultural development tool	Not considered a priority for this plan.	Not considered a priority for this plan.	Not considered a priority for this plan.
22. Enhance the visual aesthetic of the Connecticut River in urban areas	Not a priority since there is very little urban development adjacent to the Connecticut River.	Not a priority since there is very little urban development adjacent to the Connecticut River.	Proposes restoration of riparian buffers including removal of debris and improvement of scenic qualities at confluence points.
23. Balance increased water related activities and interests with environmental concerns	Proposes additional environmental education to dampen the impacts of boaters on wildlife and vegetation.	Proposes development of campsites to prevent environmental damage, proposes additional public access areas and education.	Proposes increased public access areas that are part of restoration efforts within the riparian buffers as well as education efforts.
Coordination			
24. Integrate the five-year cycles, work and plans of the five major tributary basins.	Does not address coordination with other watersheds.	Does not address coordination with other watersheds.	Does not address coordination with other watersheds.
25. Develop a River Corridor Management Plan with the 19 riverfront towns along the Connecticut River and riverfront towns in the major tributaries	Does not address this because a watershed management approach was taken.	Does not address this because a watershed management approach was taken.	Does not address this because a watershed management approach was taken.

CHAPTER 6: CONCLUSIONS AND WATERSHED-WIDE PROJECTS

Although the Five-year Action Plan identifies specific priorities and actions for each individual Reach of the Watershed, several actions should be implemented watershed-wide. The lack of water quality information on the Connecticut River and its tributaries is an issue that must be addressed on a watershed basis. Any monitoring program that is developed must be formulated to be easily adapted to the specific needs of each Reach. Education and outreach programs should be established watershed-wide as well. This includes outreach to landowners about riparian corridor issues, recreational users about potential impacts on wildlife and watershed communities about stormwater management and the protection of drinking water supplies. An advantage to this watershed-wide focus will be an increase in the number of potential partners available to help develop and implement these educational programs.

The development of the Connecticut River Watershed Five-year Action Plan highlights the difficulties associated with watershed planning. Decades of human development have occurred with little understanding or regard for watersheds. Political boundaries do not follow watershed boundaries and this has resulted in situations where numerous entities have authority and influence within the watershed. Land ownership patterns include a patchwork of private and public holdings throughout the watershed. Conflicting objectives of economic development and environmental preservation must be effectively balanced. Realigning planning efforts along watershed boundaries can prove to be very difficult due to the presence of numerous stakeholders in the form of citizens groups and administrative authorities. Often these stakeholders have conflicting ideas of what the priorities should be within watersheds. Educational efforts must be undertaken to help stakeholders understand the benefits of planning on a watershed scale. The difficulties in incorporating watershed planning in the Connecticut River Watershed are amplified due to the large size of the watershed.

The implementation of the Connecticut River Watershed Five-year Action Plan will not be a simple task and will require the involvement of both the public and private sectors. A key component of the Connecticut River Watershed Five-year Action Plan is the development of partnerships among stakeholders within the watershed to assist in the implementation of the proposed actions. Partnerships must be established with local landowners and farmers to effectively implement riparian corridor restoration projects and land protection programs.

Federal and state agencies already have many programs that can be useful for the implementation of the actions proposed in this Plan. The major role of EOEA in the implementation of the Action Plan should be to coordinate the actions of the stakeholders within the watershed to achieve the proposed objectives. A specific role that the watershed team can play is to coordinate the efforts of federal and state agencies in the implementation of existing programs to achieve watershed goals.

The Action Plan described in this report provides a framework for the implementation of the goals and objectives that were identified during the development of the Connecticut River Strategic Plan. The timeframes described in this Action Plan are estimated and it is anticipated that they will need to be revised based on the ability of the identified potential partners to address the proposed actions as well as the availability of adequate funding sources. With the help of partners in the watershed through assistance with project implementation and funding, this Action Plan will provide direction for the improvement of the Connecticut River Watershed during the next five years.

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APPENDIX A: POTENTIAL PARTNERS AND FUNDING SOURCES FOR PRIORITY ACTIONS

ACTIONS	POTENTIAL PARTNERS	POTENTIAL FUNDING
Riparian Corridors		
Riparian Corridor Restoration and Invasive Species Control Projects	• EOEA • Riverways Program, Dept. of Fisheries, Wildlife, & Environmental Law Enforcement (EOEA) • Regional Planning Agencies (PVPC, FRCOG) • EOEA Division of Conservation Services • MA Association of Conservation Commissions • UMASS Cooperative Extension Service • MA Dept. of Environmental Protection • NRCS • MA Department of Food and Agriculture Pollution Prevention Program • Silvio O. Conte National Wildlife Refuge, Invasive Species Coordinator • The Nature Conservancy • Local garden clubs, wildflower societies, etc. • Department of Environmental Management	• Strategic Planning Grant Program, EOCD Division of Community Planning, Bureau of Planning & Regionalism • EOEA • Riverways Urban Rivers Small Grants Program, EOEA Dept. of Fisheries, Wildlife & Environmental Law Enforcement • Section 319, Federal Clean Water Act • Self-Help Program, EOEA Division of Conservation Services • General Grants, EOEA Mass. Environmental Trust • Watershed Stewardship Program, EOEA • Five-Star Restoration Program, EPA • Conte National Wildlife Refuge program funding • Private/municipal investors engaged in redevelopment projects
Address Streambank Erosion within Riparian Corridors	• Connecticut River Watershed Council, Sustainable Riverbanks Program • Dept. of Environmental Protection • Regional Planning Agencies (PVPC, FRCOG)	• Section 319, Federal Clean Water Act • U.S. Fish & Wildlife Service Conte National Wildlife Refuge • General Grants, EOEA Mass. Environmental Trust • Five-Star Restoration Program, EPA • Research & Demonstration Grant Program, EOEA
Water Quality and Nonpoint Source Pollution		
Water Quality monitoring and Implementation of Remedial Projects	• EOEA • Massachusetts Water Watch Partnership • Connecticut River Watershed Council • Municipalities within The Watershed • Universities and Colleges • Franklin Regional Council of Governments • Pioneer Valley Planning Commission	• Section 604bWater Quality Management Planning Grant Program • Section 104(b)(3) Wetlands and Water Quality Grant Program • Massachusetts Environmental Trust • EOEA Water Quality Monitoring Program Grant • USGS Water Resources Research Act Grant

ACTIONS	POTENTIAL PARTNERS	POTENTIAL FUNDING
Water Quality and Nonpoint Source Pollution (cont.)		
Assess Nonpoint Source Pollution and Implement Remedial Actions	• EOEA • Municipalities within The Watershed • Franklin Regional Council of Governments • Pioneer Valley Planning Commission • Universities and Colleges • MA Department of Environmental Protection	• Section 319 Non-point Source Grant Program • Section 604b Water Quality Management Planning Grant Program • Section 104(b)(3) Wetlands and Water Quality Grant Program • Massachusetts Environmental Trust • Stormwater fee established by the towns within Reach • Grants from Section 38-Chapter 21 of M.G.L.
Reclassify First Order Streams	• MA Department of Environmental Protection • EOEA • MA Dept. of Fisheries, Wildlife and Environmental Law Enforcement • U.S. Fish & Wildlife Service, Silvio O. Conte Nat. Fish & Wildlife Refuge	• The costs of implementing this may be minimal and be absorbed by the participating agencies • Source Water Assessment Program (SWAP) Grants
Open space protection assistance and coordination	• MA Department of Environmental Management • Municipalities within the Watershed • Local Land Trusts • Valley Land Fund • The Trustees of Reservation • Massachusetts Audubon Society • New England Forestry Foundation • The Nature Conservancy • The Trust for Public Land • Regional Planning Commissions in the Reach • MA Department of Food & Agriculture • MA Dept. of Fisheries, Wildlife and Environmental Law Enforcement • Clean Water Action • DEP Drinking Water Program	• Private fundraising efforts of land protection organizations • Municipalities' land acquisition funds • Massachusetts Environmental Trust Fund • SWAP Grants for prioritizing land protection in drinking water supply recharge areas • DEP Aquifer Land Protection Program
Water Quantity		
Assess Water Quantity and Flow Modification and Implement Remedial Actions	• EOEA • Connecticut River Watershed Council • MA DFWELE • U.S. Fish & Wildlife Service • Universities and Colleges • Massachusetts Department of Environmental Protection	• Section 604b Water Quality Management Planning • Section 104(b)(3) Wetlands and Water Quality Grant Program • USGS Water Resources Research Act Grant

ACTIONS	POTENTIAL PARTNERS	POTENTIAL FUNDING
Water Quantity (cont.)		
Assist with Protection of Drinking Water Supplies	• EOEA • Massachusetts Water Watch Partnership • Connecticut River Watershed Council • Municipalities within the Watershed • Universities and Colleges • Pioneer Valley Planning Commission	• Stormwater fee established by the towns within Reach • Grants from Water Quality Management Planning, Section 604b
Wildlife Habitat and Fish Passage		
Assist with the protection of wildlife habitat	• DFWELE Riverways Program • Connecticut River Watershed Council • U.S. Fish and Wildlife Service • Department of Environmental Management • Local Land Trusts • Massachusetts Audubon Society • The Nature Conservancy • Pioneer Valley Planning Commission • Franklin Regional Council of Governments	• Department of Environmental Management • EOEA Five-Star Restoration Program • Executive Office of Communities and Development Strategic Planning Grant Program • EOEA • EOEA Massachusetts Forest Stewardship Program • EOEA Non-Game Tax Fund • EOEA Land and Water Conservation Fund • Fields Pond Foundation • National Fish and Wildlife Foundation • World Wildlife Fund Innovation Grants • The Nature Conservancy • Massachusetts Audubon Society • USFWS Conte National Wildlife Refuge • The Trustees of Reservations
Assist with Improvement of Fish Migration	• U.S. Fish and Wildlife Service • Connecticut River Watershed Council • Department of Environmental Management • Massachusetts Highway Department • Pioneer Valley Planning Commission • Massachusetts Department of Fisheries • UMASS Cooperative Extension Service • Stream Teams	• DEM Rivers and Harbors Grant Program • U.S. Fish & Wildlife Service Challenge Cost Share Grants

ACTIONS	POTENTIAL PARTNERS	POTENTIAL FUNDING
Public Access and Recreation		
Limited access car-top boat launch along the Connecticut River Water Trail	• Connecticut River Watershed Council • EOEA Riverways Program • Department of Environmental Management • Department of Fish and Wildlife • Municipalities within the Central Reach • Recreation and boating clubs • Public Access Board	• DEM Greenway and Trails Demonstration Grant • DEM Recreation Trails Grant • DEM Rivers and Harbors Grant • Watershed Stewardship Program • EOEA National Recreational Trails Act Funding Program • Kodak American Greenways Awards Program • National Rivers Coalition • Fields Pond Foundation • Public Access Board
Primitive campsite along the Connecticut River Water Trail	• Connecticut River Watershed Council • EOEA Riverways Program • Department of Environmental Management • Department of Fish and Wildlife • Municipalities within the Central Reach • Recreation and boating clubs	• Executive Office of Communities and Development Strategic Planning Grant Program • EOEA • EOEA Land and Water Conservation Fund • Massachusetts Environmental Trust
Improve recreational access where appropriate	• Connecticut River Watershed Council • Department of Environmental Management • Pioneer Valley Planning Commission • Universities and Colleges • Municipalities within the Watershed • Recreational Groups • Public Access Board • Franklin Regional Council of Governments	• Private enterprise which utilize the river for water sports • Private/municipal investors engaged in redevelopment projects • Massachusetts Department of Environmental Management Greenway Grant • Public Access Board • Massachusetts Office of Travel and Tourism (MOTT)

APPENDIX B: Public Meting Notes

Northern Reach Public Meeting
April 24, 2002
Great Falls Discovery Center, Turners Falls

The Connecticut River Watershed Action Plan public meeting for Reach I (from the Vermont State Line to the Turners Falls Dam) was held on Wednesday, April 24, 2002. Sixteen members of the general public attended the meeting. The group included several officials from local towns as well as interested citizens (see the attached attendance list). The meeting began with an introduction by John O'Leary the former Connecticut River Watershed Team Leader. Professor Robert Ryan of the University of Massachusetts then discussed the purpose of the Five-Year Action Plan and the process by which the draft plan was prepared and would be revised. A brief statement and description of the proposed priorities and actions for Reach I that are included in the draft plan was given by Brian Blanchard, Research Assistant from the University of Massachusetts.

Following the description of proposed actions, the meeting attendees were given an opportunity to suggest ideas for specific actions that they felt should be implemented during the next five years. Attendees were then asked to vote for the actions that they believe should be the top priorities for inclusion in the Five-Year Action Plan. Participants voted for their top choice and then four additional non-ranked choices. The following is a list of the proposed actions and the number of votes each received. A total of nine meeting attendees participated in the voting. Several attendees left early before the voting took place.

Proposed Actions Included in the Draft Five-Year Action Plan	**First Choice Votes**	**Other Votes**
Riparian Buffers		
Complete riparian buffer restoration projects along the river/tributaries	0	5
Establish Additional volunteer "Stream-Teams" for tributaries in Reach I	1	2
Water Quality and Nonpoint Source Pollution		
Assist willing towns will the implementation of growth management strategies	6	1
Wildlife Habitat		
Conduct Educational Outreach to recreational users in the Barton Cove Area to reduce impacts on wildlife	0	1
Public Access and Recreation		
Develop public access area at the Fall River Dam site in Bernardston	0	0
Improve access at the French King Gorge Overlook	0	2

Proposed Actions Suggested by Meeting Participants	**First Choice Votes**	**Other Votes**
Riparian Buffers		
Conduct outreach/education for private landowners along the river and its tributaries	0	4
Conduct educational outreach to boaters about invasive species and how to prevent their spread (especially zebra mussels)	0	3
Complete riparian buffer restoration project and possibly provide public access at the Schell Bridge site in W. Northfield (possibly state-owned land)	0	0
Address weed problems (non-invasives) along the Mainstem of the Connecticut River	0	0
Complete riparian buffer restoration project along Bennett Brook near or on land owned by Lane Construction (if they are a willing landowner)	0	0
Reduce human-influenced erosion in the Sawmill River	0	1
Water Quality and Nonpoint Source Pollution		
Improve/gather additional watershed-wide water quality information	2	1
Improve gravel road management practices to prevent erosion into the river's tributaries (especially Fall River, Fourmile Brook) including working with town highway departments (FRCOG lead?)	0	3
Provide emergency response preparedness training for local towns to help prevent environmental damage from hazardous spills	0	2
Improve coordination/cooperation between private landowners and the towns with the prevention and management of stormwater runoff from gravel roads	0	0
Water Quantity		
Address increasing water-use conflicts (e.g. agricultural withdrawals from Connecticut River)	0	1
Complete an inventory of drinking water aquifers in the Reach and promote protection through planning and education	0	0
Public Access and Recreation		
Maintain and upgrade existing boat ramps/access points	0	0
Develop a safe swimming area along the Connecticut River in Montague	1	0
Other		
Improve communication between state environmental agencies and the local towns	0	0
Consider changes in CPA to make it more workable for rural towns	0	1

List of Meeting Participants

Name	Address	Telephone	E-mail	Affiliation
Robert Ryan	UMASS-Amherst	545-6633	rlryan@larp.umass.edu	UMASS
Brian Blanchard	UMASS-Amherst	545-6627	bpb@larp.umass.edu	UMASS
John O'Leary	MA EOEA	587-5329	joleary@state.ma.us	CT River Watershed Team
Bill Copeland	35 Orchard Street Greenfield	774-5619	William.Copeland@bhs.org	
Ted Merrill	30 High Street Shelburne Falls	625-9765	tmerrill@crocker.com	Deerfield River Watershed Association
Sally Wright	9 Bowles Street Greenfield	774-2268	swright@ecs.umass.edu	
Greg Matney	160 Main Street Northfield	498-5543	fishchupu@aol.com	
Mary Lightner	259 South Street Bernardston	648-9085		Bernardston Conservation Commission
Chris Koch	124 Bridge Street Shelburne Falls	625-6489		
Michele Wilson	P.O. Box 54 Conway	369-4909	nesfl@valinet.com	dba Forest Logic
Robert English	367 Fourmile Brook Road Northfield		daystar@direcpc.com	
Brian Bordner	29 Ashuelot Road Northfield		brian@bordners.com	Greater Northfield Watershed Association
Thomas Shearer	101 Cross Road Northfield		tshearer@massed.net	
Tom Miner	15 Bank Row Greenfield	772-2020	crwc@crocker.com	Connecticut River Watershed Association
Whitty Sanford	15 Bank Row Greenfield	772-2020	crwc@crocker.com	Connecticut River Watershed Association
Walter Kostanski	8 Davis Street Turners Falls	863-4042		
John Krauss	15 Cabot Street Turners Falls	659-4533	krausjg@nu.com	Northeast Utilities
Robin Sherman	1 Avenue A Turners Falls	863-3208	planner@montague.net	Montague Town Planner

Central Reach Public Meeting
May 4, 2002
University of Massachusetts-Amherst

The following is a summary of the southern reach public meeting for the development of the Connecticut River Watershed Action Plan. A total of 7 people from throughout the Central Reach attended along with 1 member of the watershed team.

The proposed actions for the central reach that are included in the draft plan were presented to the audience. The attendees were then given the opportunity to suggest other actions or to comment on the actions proposed. Following the public input session, attendees were asked to vote on what they believe to be the priority actions that should be included in the watershed action plan. Each attendee was given five votes, one for their top priority and then four other choices. The results of the voting are listed below. A list of meeting attendees and contact information is also included.

Proposed Actions Included in the Draft Five-Year Action Plan	**First Choice Votes**	**Other Votes**
Riparian Buffers		
Complete riparian buffer restoration projects		1
Control invasive plant species within riparian buffers		
Complete erosion control/remediation at sites along the Mainstem of the Connecticut River		2
Water Quality and Nonpoint Source Pollution		
Reclassify headwater streams as "cold-water fisheries" or "outstanding resource waters"		
Work with stakeholders to develop a regional open space plan that focuses on water quality protection in headwater streams		
Complete water quality assessment and monitoring in high priority subwatersheds as determined by a GIS-based land use evaluation		
Conduct nonpoint source pollution assessments in priority subwatersheds		
Conduct outreach and education on stormwater management issues		
Conduct water quality monitoring of the Mainstem CT River		
Water Quantity		
Identify impacts of surface drinking water supplies on tributary streams		
Use build-out data to estimate impacts of future development on existing and potential water supplies (coordinate with Hadley)		
Wildlife Habitat		
Support/Assist with ongoing or planned fish passage improvement projects		
Public Access and Recreation		
Establish primitive campsite(s) along the Connecticut River Water Trail		3
Develop an additional car-top boat access along the Connecticut River Water Trail		

Proposed Actions Suggested by Meeting Participants	First Choice Votes	Other Votes
Riparian Buffers		
Work with farmers on increasing riparian buffer width/restoration also looking at increasing yields to offset loss in production		3
Obtain funding to continue APR Program	2	1
Address erosion north of Coolidge Bridge in Hadley		
Focus restoration efforts on riparian connectivity in highly developed areas (i.e. from Holyoke south)	1	
Water Quality and Nonpoint Source Pollution		
Conduct water quality monitoring in Greater CT River Watershed	2	2
Improve water quality in small tributaries		
Water Quantity		
Address management of water quantity in CT River and impact of dams. Address Turners Falls Dam in future permitting		
Lobby for changes in regulations to maintain minimum flows in tributaries to support ecological value		1
Protect prime aquifers in the watershed		
Water conservation education (in local schools, etc.)	1	
Work with local towns on aquifer protection efforts (bylaws, ordinances, etc.)		2
Wildlife Habitat		
Assist with preservation of Puritan Tiger Beetle population		2
Public Access and Recreation		
Provide handicap access at car-top boat access		
Provide educational material at both public and private access points about riparian corridors and the potential impacts from recreational use including invasive species (especially Zebra Mussels)		4
Conduct boater education about water quality and quantity issues in the River		
Work with the implementation of the CRLMP for the Holyoke Dam		
Conduct an inventory and assessment of Chapter 91 Dock Permits along the Mainstem Connecticut River		
Provide more access to the northern part of the Central Reach for motorboats		
Provide more enforcement of the existing boating rules on the river by the Environmental Police		

List of Meeting Participants:

Name	Address	Phone	Email
Gil & Sara Bach	9 Bach Lane, S. Hadley	534-3250	Rokinbach2@aol.com
Paul Alexanderson	33 Aquavitae Road, Hadley	586-8824	
Tom Miner	CRWC	772-2020	Crwc@crocker.com
Whitty Sanford	954 Reeds Bridge Road, Conway	369-4911	Wtminer@crocker.com
Alan Swedlund	542 Riner Road, Deerfield	774-3337	Swedlund@anthro.umass.edu
Katja Meinke	(Hills North)	545-6627	Kmeinke@larp.umass.edu

Southern Reach Public Meeting
May 13, 2002
Springfield Science Museum

The following is a summary of the southern reach public meeting for the development of the Connecticut River Watershed Action Plan. A total of 15 people from throughout the southern reach attended along with 3 members of the watershed team. The New England Shad Association had a number of its members present.

The proposed actions for the southern reach that are included in the draft plan were presented to the audience. The attendees were then given the opportunity to suggest other actions or to comment on the actions proposed. Following the public input session, attendees were asked to vote on what they believe to be the priority actions that should be included in the watershed action plan. Each attendee was given five votes, one for their top priority and then four other choices. The results of the voting are listed below. A list of meeting attendees and contact information is also included.

Proposed Actions in Draft Five-Year Action Plan	First Choice Votes	Other Votes
Riparian Corridors		
Control invasive plant species in riparian buffers (i.e. Purple Loosestrife)		2
Restore and/or protect riparian buffers at tributary confluence points	1	1
Remove or mitigate impervious surfaces in riparian buffers		1
Water Quality and Nonpoint Source Pollution		
Conduct education and outreach on stormwater issues for cities and towns	2	2
Address nonpoint source pollution through mitigation of impervious surfaces near rivers and streams		5
Water Quantity		
Work with communities to expand protection of drinking water aquifers		
Wildlife Habitat and Fish Passage		
Include fish passage improvements at road crossings during reconstruction		
Protect certified habitat along the mainstem of the Connecticut River	3	1
Protect and improve habitat at tributary confluence points		
Public Access and Recreation		
Assist with the improvement of existing access points along the River	1	2
Create lateral trails along tributaries to connect town/city centers to the mainstem river and riverwalk /bike path. Also include access to important destinations such as Forest Park		2
Develop additional access points along the mainstem river		
Implement a public relations campaign to promote the use of the river and its tributaries while protecting natural resources		

Proposed Actions suggested by Meeting Participants	First Choice Votes	Other Votes
Riparian Corridors		
Plant shrubbery around waterbodies to discourage Canadian Geese while utilizing pathways to maintain public access to water		1
Promote removal of lawns and reduction of fertilizer use along streams and rivers such as golf courses, parks and residences		1
Water Quality and Nonpoint Source Pollution		
Obtain additional info about fish contamination in the watershed including dissemination of the results of the "Source to Sea" Study		
Conduct outreach to citizens about the contamination of fish through the use of signs and brochures (follow Springfield Model), specifically target ethnic groups		3
Examine impacts of water quality on Biota		1
Play a role in moving the CSO abatement forward by taking steps to implement the plan	3	3
Implement an active water quality monitoring program		3
Assist local towns and cities with development of Stormwater Management Ordinances to help reduce impacts of future development		1
Assist with improvement of environmental quality when redeveloping sites	1	1
Water Quantity		
Rebuild Enfield Dam to increase water levels in the Southern Reach		
Wildlife Habitat		
Install fish passage around dams on smaller tributaries i.e. Mill River-Springfield, tributaries in Forest Park		2
Install fish passage around dams in Chicopee River (forward suggestion to Chicopee River Watershed Team)		
Public Access and Recreation		
Reduce impacts of motorboats along mainstem of the river		5
Develop management plan for recreational use of the River		4
Balance multiple uses of the River e.g. motorboats vs. paddle boats, fishing and wildlife, balance boat access with other types of access		
Promote riverfront festivals partnering with local businesses		2
Increase visual access to the river during redevelopment of parcels		
Develop additional parking and handicap access at Medina St. Boat Ramp in Chicopee (Chicopee River?).		1
Increase parking at all access points along the mainstem of the river especially the State Boat Ramp	1	1
Improve access for fisherman over flood levees in Holyoke	1	2
Improve layout of State Boat Ramp in Holyoke		

List of Meeting Participants

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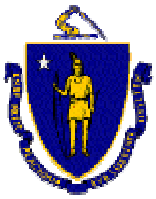

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